



FUN ACTIVITY

SURVIVAL OF THE SPECIES

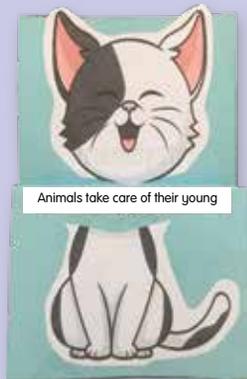
APPARATUS AND MATERIALS

Scissors, glue, pictures of animals, and manila cards.



STEPS

1. Select some examples of how animals ensure the survival of their young.
2. Draw or print some pictures of your choice of animals and their young. Paste them on the folded manila cards as shown below.
3. Paste the pictures showing how the animals ensure the survival of their young on each fold.



4. Exhibit your work and discuss with your friends.



- (a) Why do animals protect their young? Explain.
- (b) How do geese, lizards, and snails protect their eggs?

IMAGINARY ANIMAL

The pupils of Year 5 Zamrud are helping Mr Zaki to clean the school storeroom that stores recyclable materials. The materials are collected from the pupils and their parents during the recycling campaign conducted by the Science Committee of the school. Observe the situation below.





Mr Zaki, can I have some of these boxes and tools?



Sure, Chan. What do you want to do with them?

I want to do a project using recyclable materials.



Oh, I see! The Science Committee of the school will be organising a competition to create an imaginary animal model. We have just learned about the specific characteristics and behaviours of animals to protect themselves. I encourage all of you to join the competition.



Sure, Mr Zaki. I will join it. This box will be used to make the wings of my imaginary animal model.

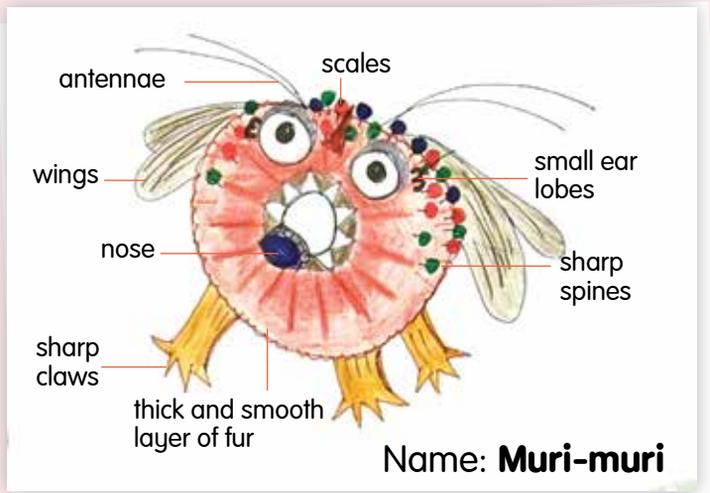


Wow, that's interesting! I will also join the competition. This plastic bottle will be used to make the nose of my imaginary animal model.



That's good. All your projects will be displayed during the science fair later.

Let us look at the imaginary animal model made by Ana.



This is the sketch of my imaginary animal model.

The sketch of Ana's imaginary animal model



This is a model of my imaginary animal that has been completed. I named it Muri-muri. Muri-muri is very unique, special, and is capable of saving itself.

Ana's imaginary animal model

Great! Why are there spikes on its thick-fur body?



This is its speciality. Its thick and smooth fur can deceive the enemy by hiding sharp spines for self-protection. Its thick fur also functions as a thermal insulator.



Wow, that's good, Ana! What about Melia, Ravi, and Chan? I am sure your imaginary animal models are also interesting to be shared. Tell us about their specialities.



FUN ACTIVITY

IMAGINARY ANIMAL

APPARATUS AND MATERIALS

A4 paper, pencils, and coloured pencils.



STEPS

1. Sketch a model of your imaginary animal on the A4 paper.
2. Label the specific characteristics and behaviours of your imaginary animal model.
3. Suggest the needed materials and apparatus to build your imaginary animal model.
4. Then, make your imaginary animal model.
5. Present your work in front of the class.



- (a) Explain the specific characteristics of your imaginary animal that can be used to protect it from enemies and extreme weather.
- (b) What will happen if your imaginary animal does not have the specific characteristics as mentioned?
- (c) In your opinion, why does God create different specific characteristics for animals to protect themselves?
- (d) How those characteristics ensure the balance of nature?

FOOD CHAIN

Living things in a habitat is interdependent for food sources. Identify the animals in the situation below and state their food.



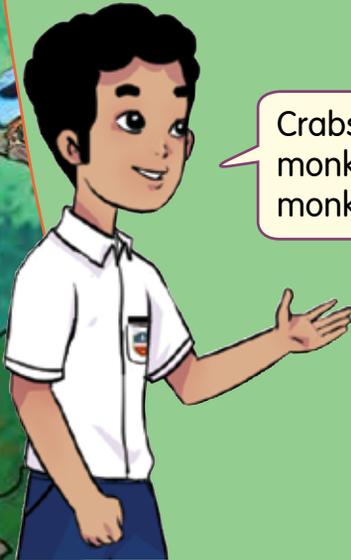
Based on the situation at the mangrove swamp, what is the food for each identified animal?



I observed a squirrel eating a fruit and an otter eating a fish.



What are the foods for other animals such as crabs, monkeys, snakes, and birds?



Crabs eat small animals. Birds and monkeys eat fruits. Snakes eat monkeys, birds, and squirrels.



Wow! It seems like all the animals are interdependent. Some animals eat plants and some eat other animals.



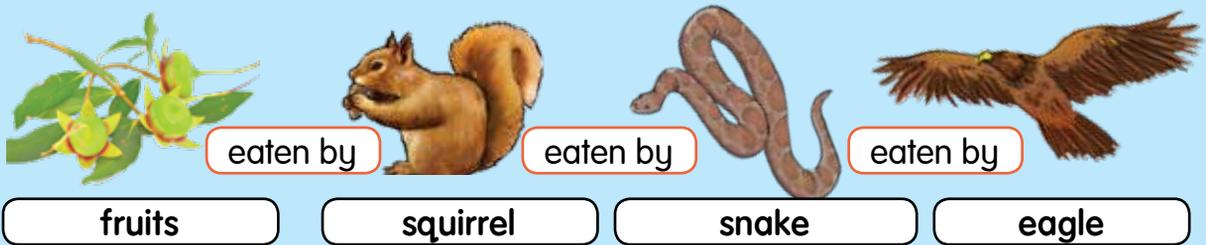
This means that the interdependence among these animals is in the form of a food relationship which is connected like a chain.

Based on this situation, what is the meaning of a food chain?

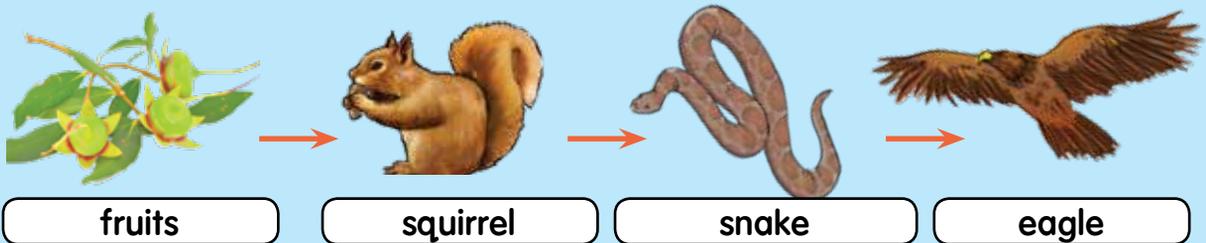


A food chain is the **food relationship among living things.**

Therefore, based on all the living things identified in the habitat at the mangrove swamp, we can state that:



The relationship is shown as follows:



This food chain can finally be summarised as follows:

fruits → squirrel → snake → eagle

arrow (→) means eaten by

The food relationship among the living things above is an example of a food chain in a mangrove swamp habitat. Build examples of other food chains in this habitat.



PRODUCER AND CONSUMER

Let us identify the **producers** and **consumers** based on the food chain in a mangrove swamp habitat.

Do you still remember about photosynthesis? In the presence of sunlight, plants make their own food. Therefore, plants are called **producers**.



Mr Zaki, can other living things be producers?

No, because only plants can carry out photosynthesis. Where do plants get their energy from?



Plants get their energy from the sunlight. The sunlight is the source of energy for plants to carry out the process of photosynthesis.



That's right. So, can you identify the producers and consumers by using other examples of living things found in the mangrove swamp?



Producers obtain energy from the Sun. What about other animals such as squirrels, otters, snakes, and eagles that cannot make their own food? Where do these animals get their energy source from?



A squirrel is a **consumer** that feeds on fruits.



An otter is a **consumer** that feeds on fish.

Thus, the squirrel and otter obtain energy from the food they feed on.

Living things can also be related in terms of **energy transfer** as follows:



Squirrels are consumers that obtain energy by eating fruits.

Snakes are consumers that obtain energy by eating squirrels.



Eagles are consumers that obtain energy by eating snakes.

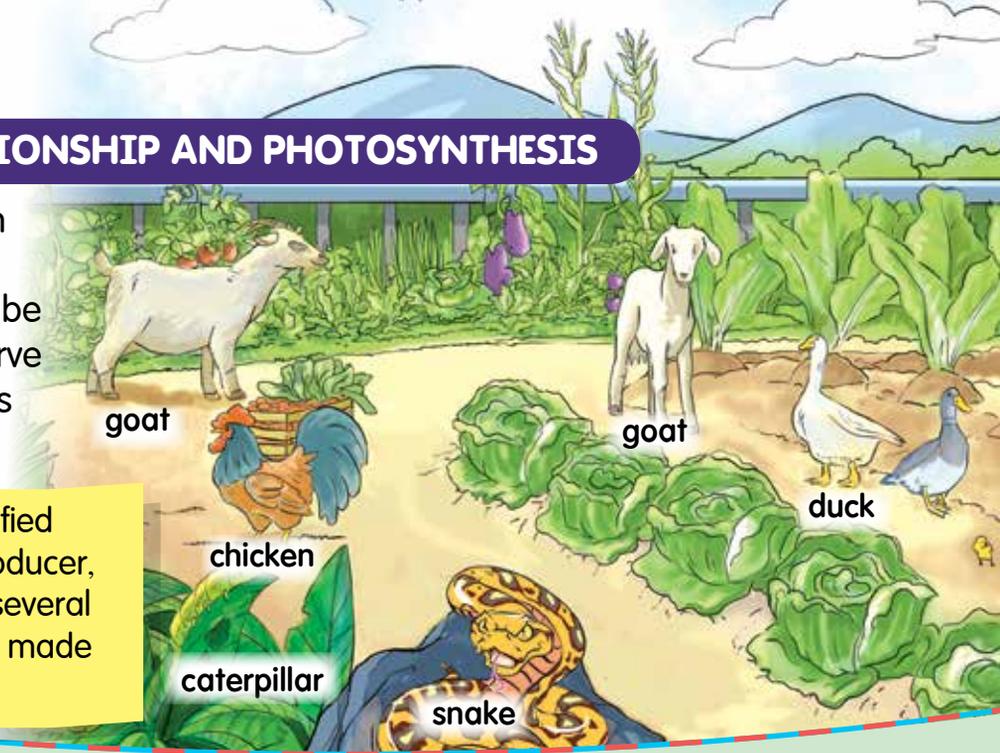
arrow (\longrightarrow) also shows the **flow of energy transfer** in a food chain

What is the main source of energy for the food relationship above?

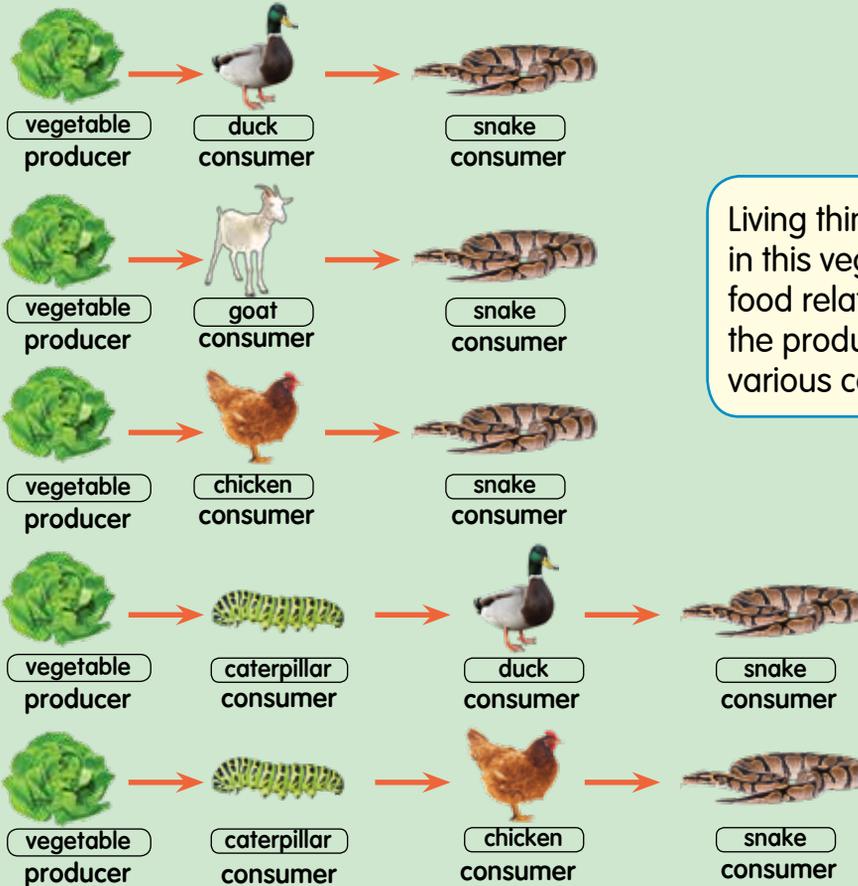


FOOD RELATIONSHIP AND PHOTOSYNTHESIS

The relationship in a food chain also causes energy to be transferred. Observe the situation in this farm.



Based on the identified consumers and producer, energy transfer in several food chains can be made as follows:



Living things that are found in this vegetable farm form food relationships between the producer and the various consumers.



Therefore, the food chain also shows the relationship between the living things in terms of energy transfer.

The diagram below shows the food relationship among living things. It shows the process of photosynthesis in terms of energy transfer in the food chain of a paddy field habitat.

The Sun is the main source of energy in an ecosystem. The Sun provides light and heat energy.

The paddy plant is the producer that absorbs energy from sunlight to carry out the process of photosynthesis.



SCIENCE INFO

An ecosystem is an ecological system of natural living things that live together, interact, and depend on one another in a habitat. An ecosystem includes its environments such as water, soil, air, and the Sun as the source of energy.

Energy is transferred to the end consumer which is the eagle that eats the snake. The eagle also eats the duck and the chicken.

The duck and the chicken are among the consumers that eat paddy plants. Therefore, these consumers get energy from the paddy plants.



Energy is transferred to the next consumer which is the snake that eats the duck and the chicken.

What is the importance of the food relationship among living things in terms of energy transfer?



FOOD WEB

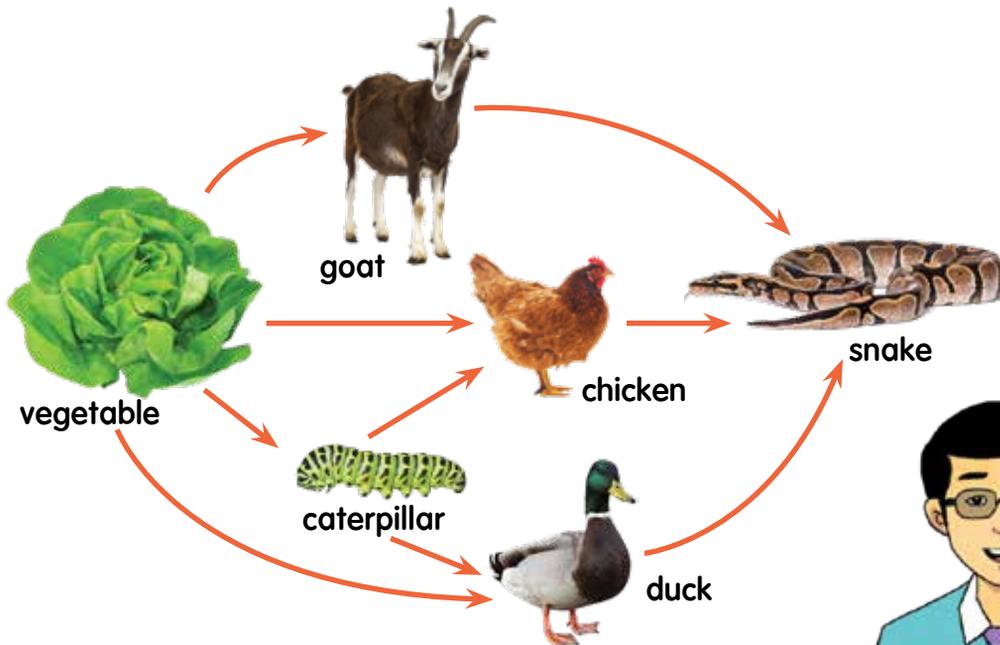
Now, you have identified the living things in several habitats including those in the vegetable farm. Caterpillars, ducks, chickens, goats, and snakes are the living things found in this vegetable farm.



Below are the food chains that can be built based on the habitat in the vegetable farm.

- (a) vegetable → duck → snake
- (b) vegetable → goat → snake
- (c) vegetable → chicken → snake
- (d) vegetable → caterpillar → duck → snake
- (e) vegetable → caterpillar → chicken → snake

These food chains can be combined to form a food web as shown below.



What is a food web?





Observe the pond habitat in the picture above. What are the living things that can be found in the habitat?



There are waterweeds, small fish, big fish, tadpoles, frogs, storks, grasshoppers, and snails in this habitat.

It seems that tadpoles, small fish, snails, and grasshoppers also eat the same food which is the waterweeds.



Below are some food chains that can be built based on the pond habitat.

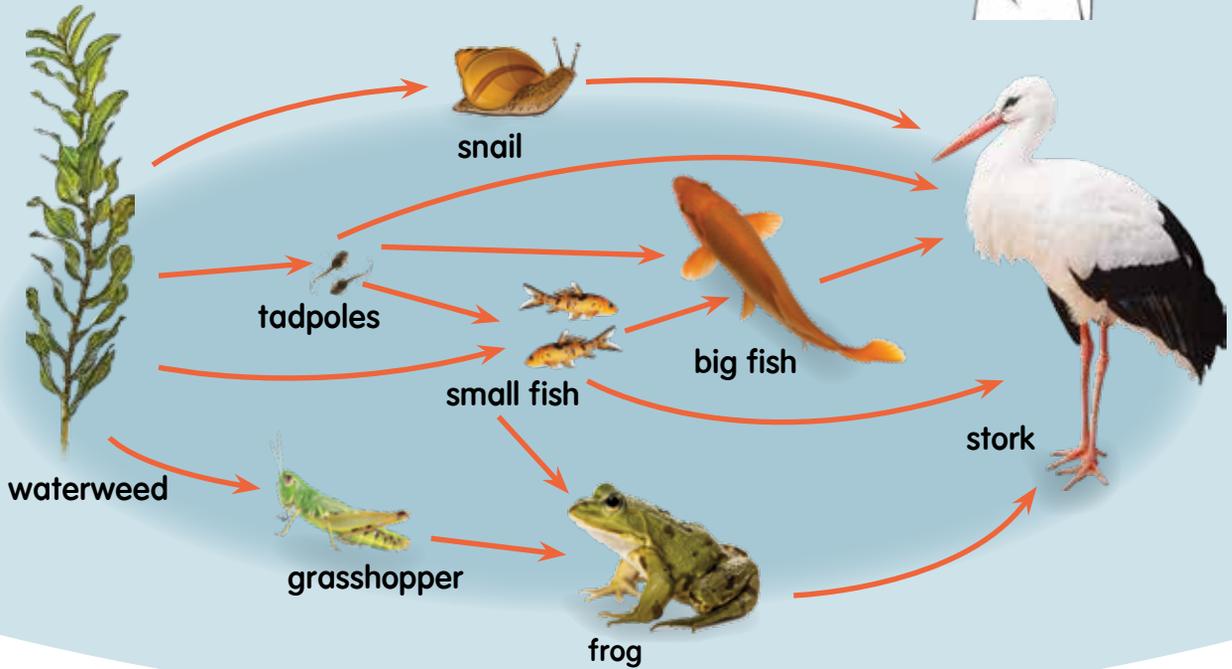
- (a) waterweed → snail → stork
- (b) waterweed → tadpoles → stork
- (c) waterweed → small fish → frog → stork
- (d) waterweed → grasshopper → frog → stork
- (e) waterweed → small fish → big fish → stork
- (f) waterweed → tadpoles → small fish → stork
- (g) waterweed → tadpoles → big fish → stork
- (h) waterweed → tadpoles → small fish → big fish → stork



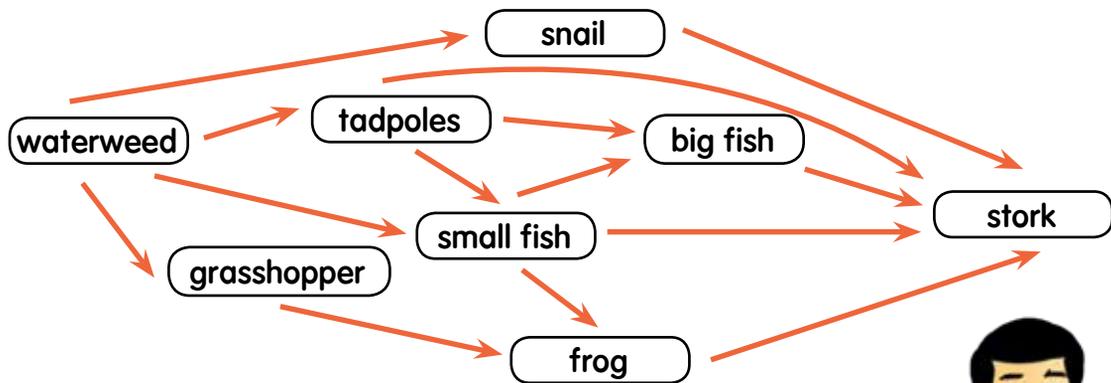
Now, let's combine all the food chains that have been built into a food web as shown below.



Mr Zaki, this is a food web diagram that I have built based on all the earlier food chains.



The food web can be summarised as shown below.



Identify other food chains in this habitat and combine them to form a food web.





FUN ACTIVITY

FOOD WEB



APPARATUS AND MATERIALS

Marker pens, pictures of various habitats, and manila cards.

STEPS




Group: I
Habitat: pond
Producer: waterweed
Consumers: fish, stork, grasshopper, frog, snail, and tadpoles.

1. Observe the given pictures. Identify the habitats in the pictures.

2. Discuss and identify the producer and consumers in each of these habitats.



Group: I
Habitat: pond
Producer: waterweed
Consumers: fish, stork, grasshopper, frog, snail, and tadpoles.

Food chain

- (a) waterweed → snail → stork
- (b) waterweed → tadpoles → stork
- (c) waterweed → grasshopper → frog → stork

Food web

```

graph LR
    waterweed --> snail
    waterweed --> tadpoles
    waterweed --> grasshopper
    snail --> stork
    tadpoles --> stork
    grasshopper --> frog
    frog --> stork
  
```



Group: I
Habitat: pond
Producer: waterweed
Consumers: fish, stork, grasshopper, frog, snail, and tadpoles.

Food chain

- (a) waterweed → snail → stork
- (b) waterweed → tadpoles → stork
- (c) waterweed → grasshopper → frog → stork

Food web

```

graph LR
    waterweed --> snail
    waterweed --> tadpoles
    waterweed --> grasshopper
    snail --> stork
    tadpoles --> stork
    grasshopper --> frog
    frog --> stork
  
```



3. Build some food chains on the manila cards. Based on the food chains, build a food web.

4. Present your work in front of the class.

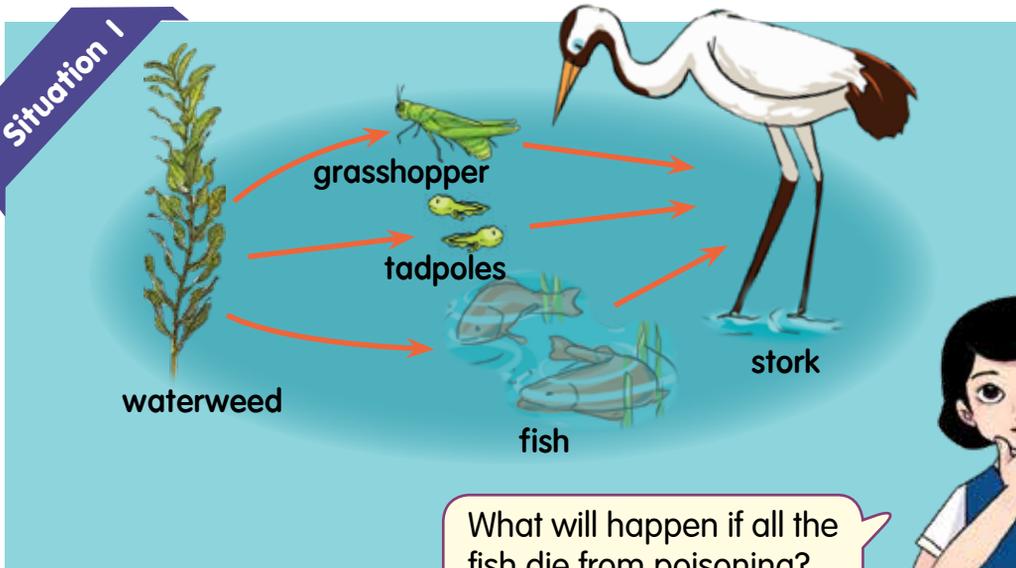
- ?**
- (a) What is the main source of energy in this habitat?
 - (b) Classify the producer and consumers in each habitat using suitable graphic organisers. Discuss.

TEACHER'S NOTES

Teachers prepare pictures of different habitats.

In the food web, energy is also transferred from one living thing to another.

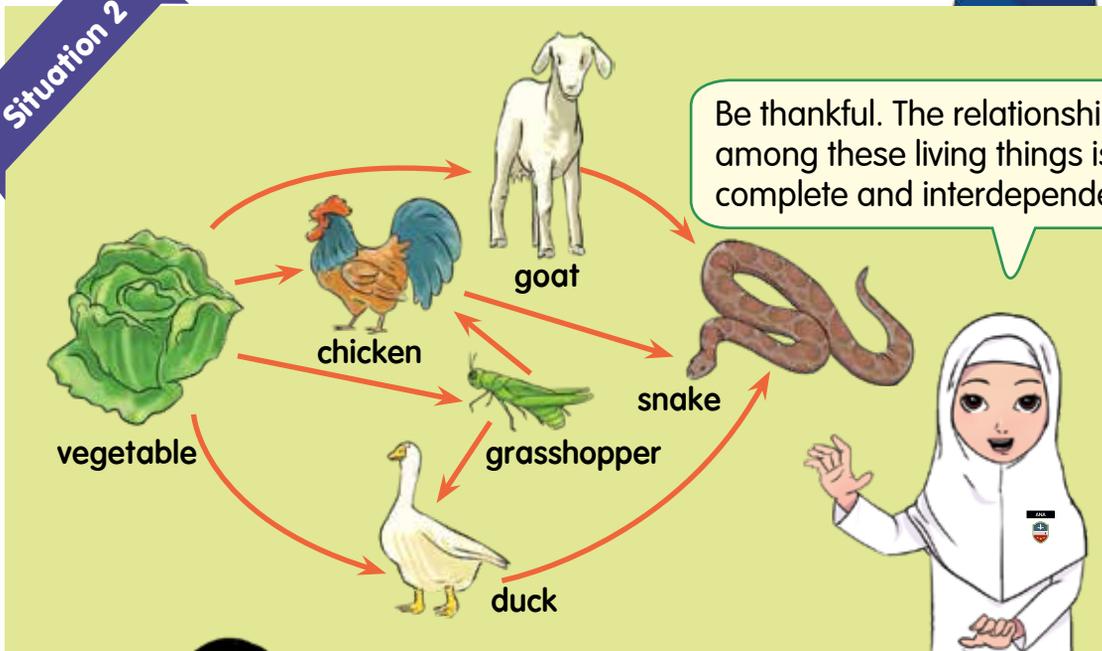
Situation 1



What will happen if all the fish die from poisoning?



Situation 2



Be thankful. The relationship among these living things is still complete and interdependent.



Predict the effects on other living things if all the vegetables in the farm were destroyed due to a flood.



EFFECTS OF POPULATION CHANGE

In a habitat, the energy transfer occurs continuously in the food chain. Any changes in the population of living things will affect the whole ecosystem.



Mr Zaki, how does a population change occur in a food chain?

There are many reasons for the changes in the population of living things. For examples, tremendous weather changes and the spread of a pandemic.



Unplanned forest exploration.



Forest fire.



Illegal hunting activities.



SCIENCE INFO

A population is a group of living things or species found in a habitat. Population change indicates a change in the number of species in the habitat.

What are the effects on living things if there is a population change in the food web of a habitat?



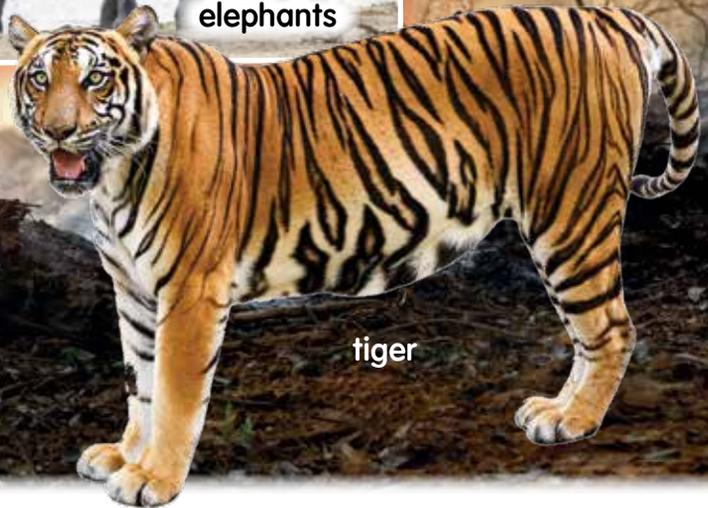
Animals will lose their natural habitats and food resources. Animals may also die or they have to move elsewhere in search of a new habitat.



kangaroos



elephants



tiger

SCIENCE INFO

It is estimated that 480 million animals died due to a bush fire in Australia since the end of August 2019. At least 8000 koalas perished in the fire. About 30 percent of the koalas' habitats are also destroyed.

Population change in the food chain of a habitat will disrupt other living things. Food relationships among living things are also affected. This causes a major change to food chains and food webs.



Predict other effects on living things due to a population change in the food web of a habitat. Describe.



FUN SCIENCE

MINI TERRARIUM

Build a mini terrarium using used materials such as aquariums, pebbles, soil, small plants, and suitable small animals. Decorate your mini terrarium creatively.



SCIENCE INFO

Terrarium is a transparent container used to preserve plants or small animals by creating a similar environment to their natural habitats.



MIND REFLECTION

1. The survival of an animal species is the ability for animals to maintain their species to avoid extinction.
2. Animals have specific characteristics on parts of their bodies and behaviours to protect themselves from enemies as follows:
 - big and sharp claws.
 - stings that can release venom.
 - patterns that resemble fake eyes on the wings.
 - strong leg muscles.
 - sharp spines.
 - inflating the bodies that have sharp spines.
 - poisonous.
 - spurting out black ink.
 - curling up the bodies.
 - hard shells.
 - produce bad smell.
 - hard scales.
 - sharp horns.
 - raising quills with sharp spines.
 - detaching parts of the bodies.
 - withdrawing parts of the bodies into the shells.
 - live in groups.

3. Animals have specific characteristics on parts of their bodies and behaviours to protect themselves from extreme weather as follows:
 - thick fur.
 - short and densed feathers.
 - thick layers of fat.
 - wallow in water or mud.
 - large ear lobes.
 - hibernate.
 - small ear lobes.
 - migrate.
 - humps.
4. Animals protect their eggs in various ways as follows:
 - hide their eggs.
 - incubate their eggs.
 - lay their eggs on the surface of rocks.
 - bury their eggs in the soil.
 - lay many eggs.
 - slimy eggs.
 - smelly eggs.
5. Animals ensure that their young survive in various ways as follows:
 - protect their young.
 - suckle their young.
 - raise their young in pouches.
 - feed their young.
 - place the young in their mouths.
 - attack the enemies when their young are in danger.
6. Survival of species is important for the balance of the ecosystem.
7. A food chain is the food relationship among living things.
8. A food web is a combination of more than one food chain.
9. Producers are living things that can make their own food by carrying out the process of photosynthesis.
10. Consumers obtain energy from eating other living things.
11. The Sun is the main source of energy in an ecosystem.
12. The balance of an ecosystem will be affected when there is a major population change in a habitat.
13. If population change occurs in a food web of a habitat, animals will lose their natural habitat and food source. The animals may also die or migrate to other places to look for a new habitat.



MIND TEST

Answer all questions in the Science exercise book.

- What is meant by the survival of animal species?
 - The ability of animals to protect their young.
 - Animals migrate to other places when there is no food.
 - Animals can prevent their species from extinction.
 - Animals have specific behaviours to find a mate.
- Identify the following animals with their specific characteristics to protect themselves from enemies.



3. Match each phrase to the correct animal.

lays many eggs

incubates its eggs

produces slimy eggs



4. How do the following animals keep their young alive?



5. Observe the situation below and answer the following questions:

A cat tried to catch a lizard but it only managed to catch the tip of the lizard's tail.



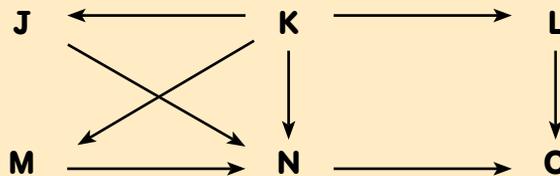
- In your opinion, has the cat succeeded in catching the lizard? Give an inference for your answer.
 - What is the specific behaviour of the lizard that protects it from the cat?
 - How can this behaviour protect the lizard?
 - Give an example of another animal that has similar specific behaviour as the lizard.
6. State the meaning of each of the following terms.

producer

food chain

food web

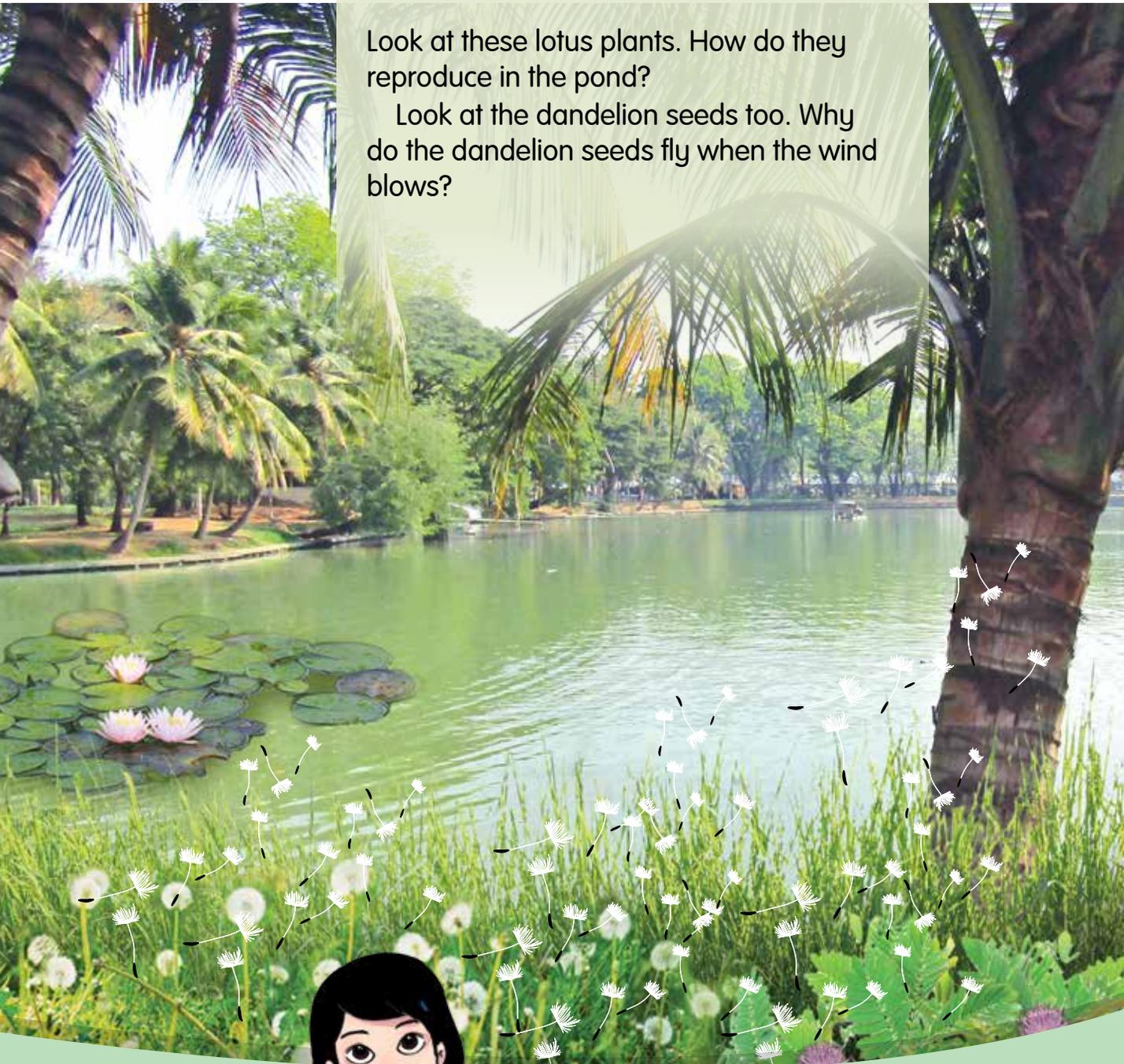
7. The diagram below shows the food web in a habitat.



- Build three food chains based on the living things in this habitat.
- How many omnivorous animals are present in this food web?
- If K were destroyed due to a pandemic, predict the impact on the populations of N and O.
- What is the main source of energy, producer, and consumers in this habitat?
- Based on the diagram, predict K, L, N and O.
- What is the importance of food relationship among living things?

Look at these lotus plants. How do they reproduce in the pond?

Look at the dandelion seeds too. Why do the dandelion seeds fly when the wind blows?



How do plants maintain their species?

PROTECTION FROM ENEMIES

Plants have various specific characteristics to protect themselves from the enemies to ensure the survival of their species.

How do these specific characteristics allow plants to protect themselves from the enemies?



Let us observe the situation of Melia and her sister at their grandfather's orchard.



Ouch! The durian thorns are very sharp!

Be careful, little sister. These sharp thorns can hurt the enemies that want to eat the durian.

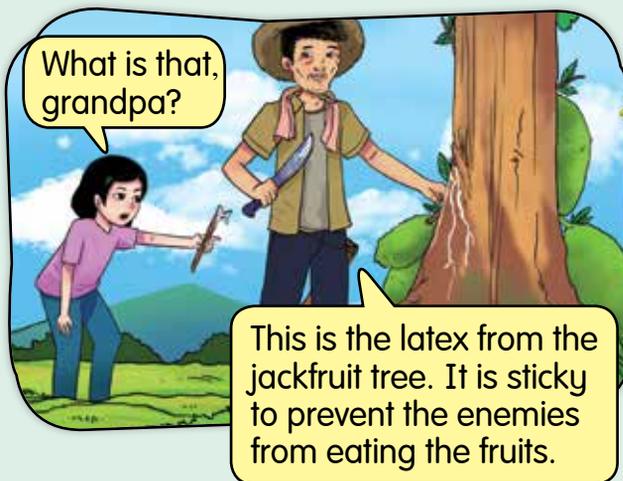


durian



pineapple

Sharp thorns



What is that, grandpa?

This is the latex from the jackfruit tree. It is sticky to prevent the enemies from eating the fruits.



jackfruit tree



papaya tree

Produce latex



bamboo plant



pumpkin plant

Fine hairs



That's dangerous! Don't pick the flowers. The leaves, stems, roots, and flowers of the allamanda plant are poisonous. The poison causes poisoning or even death.



allamanda plant



pong pong tree

Poisonous



Yuck! That stinks!

That is a citronella plant. Its leaves produce strong bad smell so that the enemies will go away.



citronella plant



lantana plant

Bad smell

Sharp thorns, produce latex, fine hairs, poisonous, and bad smell are the specific characteristics of plants that can protect them from the enemies. These ensure the survival of the plant species.



rafflesia

State the specific characteristics of the rafflesias that can protect them from the enemies.



SCIENCE INFO

Citronella plants are also known as mosquito repellent plants. These plants are usually planted around the house. The leaves release a smell that mosquitoes dislike.



citronella plant



FUN ACTIVITY

PLANT SHIELDS

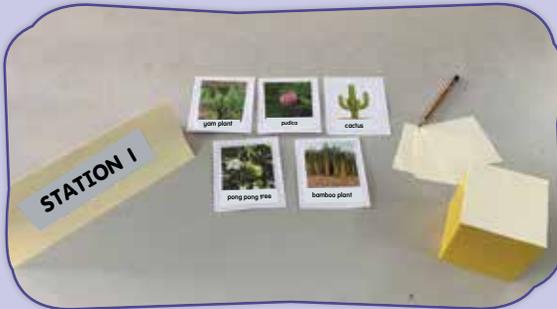


APPARATUS AND MATERIALS

Pencils, containers, 25 picture cards of plants with various specific characteristics, and adhesive notes.

STEPS

1. Move to each station in groups.



2. At the first station, observe the pictures and identify the specific characteristics of the plants that are used to protect them from the enemies.

3. Write the identified specific characteristics on adhesive notes and place them in the container.

4. Repeat steps 1 and 3 at each station.

5. After completing the task at all stations, the group representative will take a container from one station.

6. Discuss the answers in the container.

7. Construct a mind map based on the result of the discussion.



- (a) How do the specific characteristics of the plants in the pictures protect the plants from enemies?
- (b) Give some examples of other plants with similar specific characteristics with the ones you have identified.

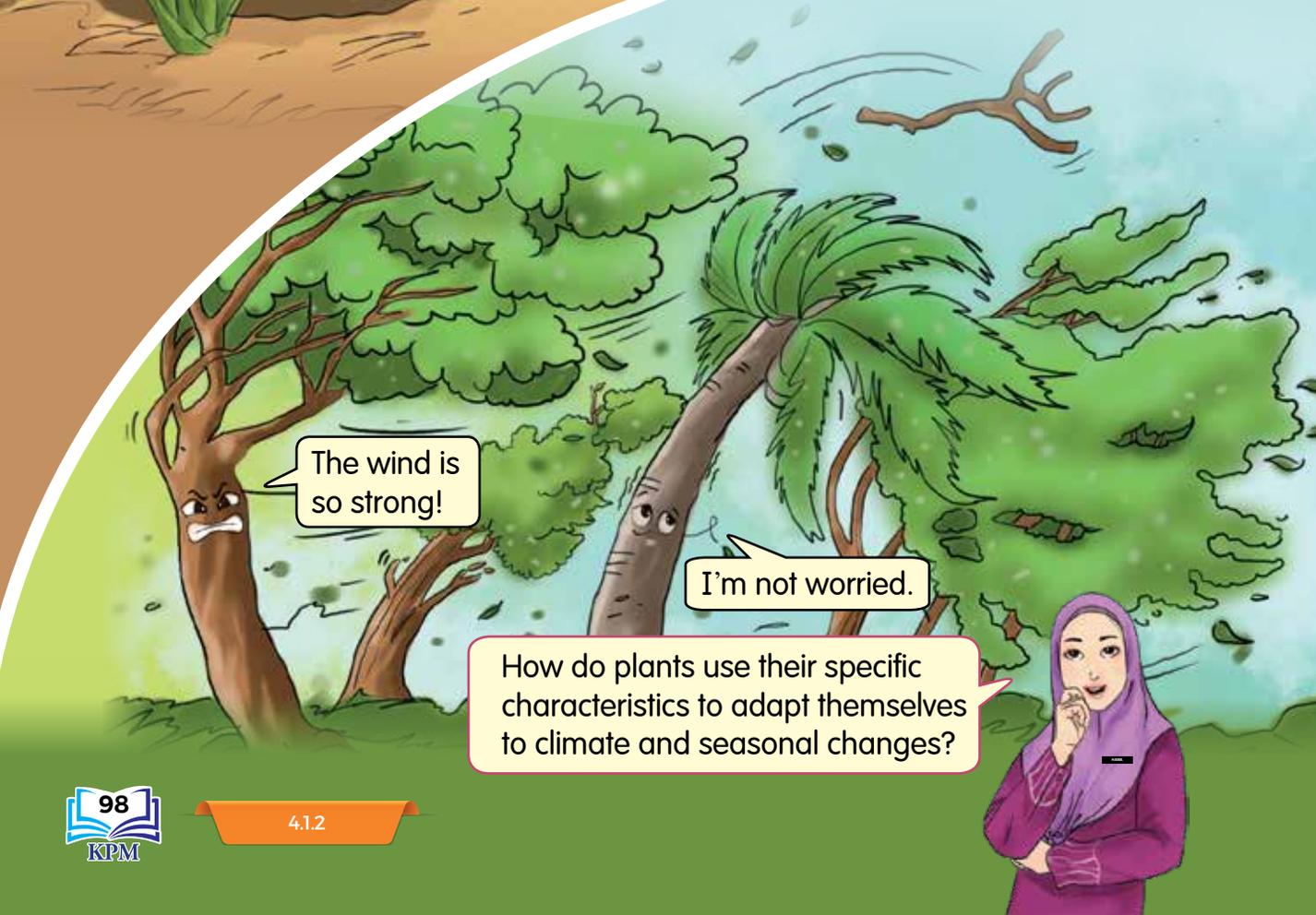
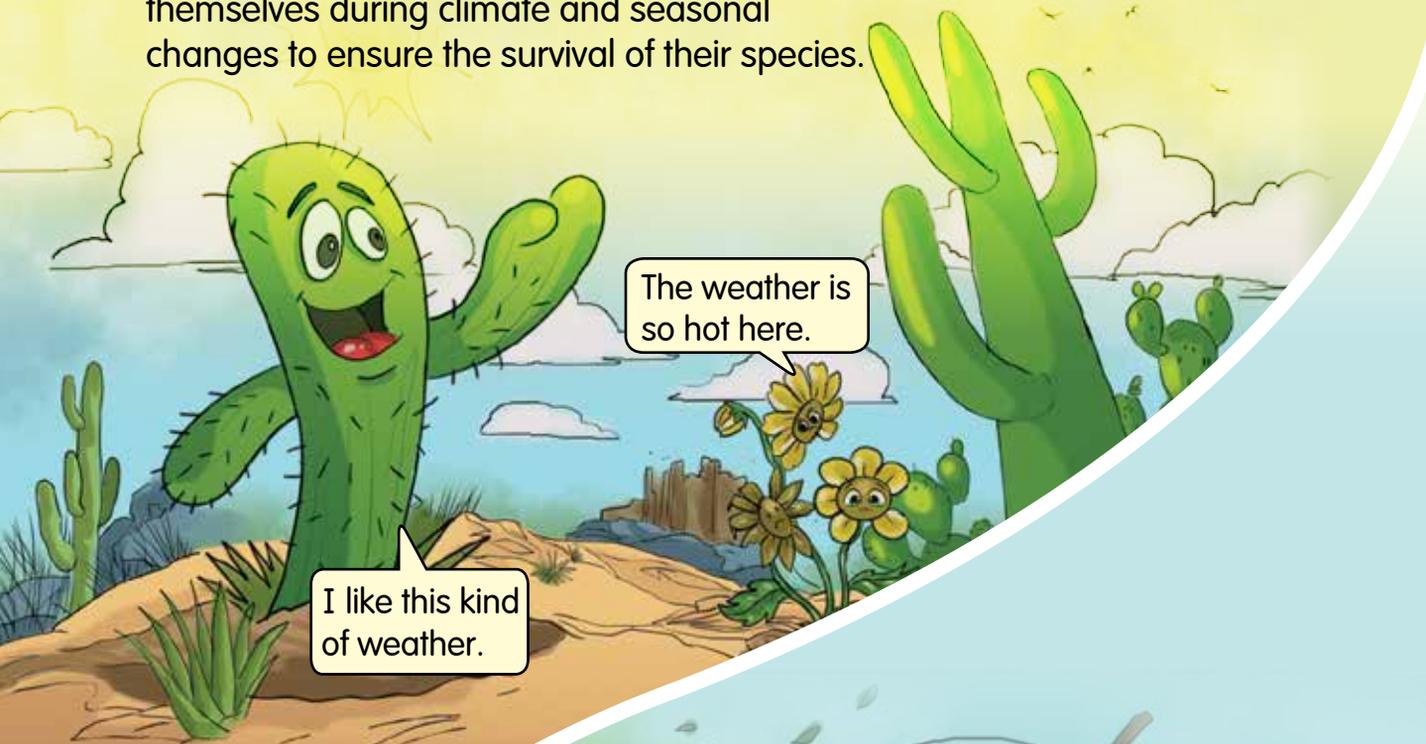
TEACHER'S NOTES

Prepare 25 photos of plants with different specific characteristics. Place the apparatus and materials at each station.



ADAPTING TO CLIMATE AND SEASONAL CHANGES

Plants have specific characteristics to adapt themselves during climate and seasonal changes to ensure the survival of their species.



Let us understand the following specific characteristics of plants to adapt to climate and seasonal changes.

STRONG SEASONAL WIND



I'm a coconut tree. I have a **flexible trunk** and **split leaves** that can reduce the force of strong winds.



coconut tree



I'm a casuarina tree. My tree **trunk and branches are flexible** and I have **needle-shaped leaves** that can reduce the force of strong winds.



casuarina tree

HOT CLIMATE AND DRY SEASON

I'm a cactus plant. I can survive in a hot climate and during the dry season. My **leaves are modified as spikes** to prevent water loss. My **stem can store water** and my **long roots** can absorb water deep in the soil.



cactus plant



tomato plant

I'm a tomato plant. My stem and leaves are covered with **fine hairs** to prevent water loss when the weather is hot.



I'm a turmeric plant. I can **roll my leaves** when the weather is hot to prevent water loss.



turmeric plant



yam plant

I'm a yam plant. I have **waxy leaves** to avoid excessive water loss when the weather is hot.

I'm a rubber tree. I **shed** my **leaves** when the weather is hot and during the dry season to avoid water loss.



rubber tree

COLD CLIMATE

I'm a maple tree. I have **thick bark** covering my trunk to protect myself from the cold climate.



maple tree



needle-shaped leaves



pine tree



thick bark

Pine trees have specific characteristics to survive during strong seasonal wind and during hot and cold weather. Based on the specific characteristics mentioned, how do pine trees adapt themselves to climate and seasonal changes?

Flexible trunks, split leaves, needle-shaped leaves, modified leaves as spikes, water storing stems, long roots, fine hairs, rolling leaves, waxy leaves, shedding leaves, and thick bark are the specific characteristics of plants to adapt to climate and seasonal changes for the survival of their species.

Bougainvillea trees will shed their leaves when the weather is hot and during the dry season. Why?



bougainvillea tree



SCIENCE INFO

Thick bark covering the trunks of trees prevent the absorbed water from freezing in an extremely cold climate.



FUN ACTIVITY

DIGITAL POSTCARD

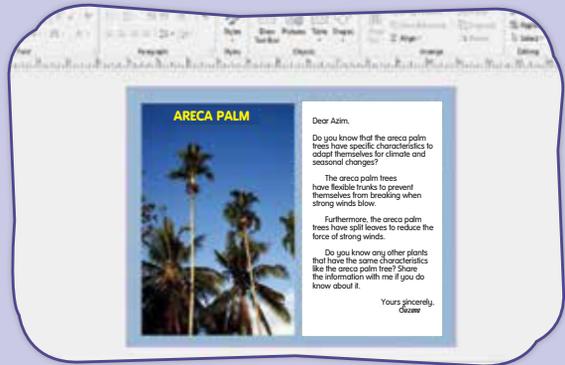
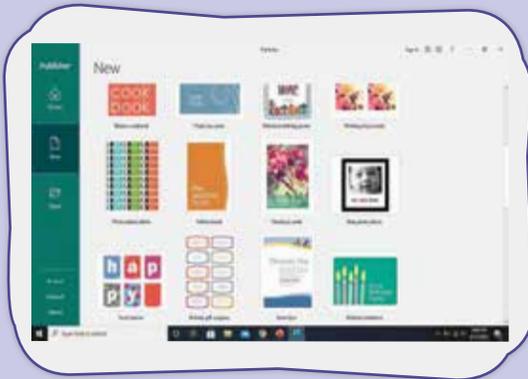
APPARATUS AND MATERIALS

Computer and internet access.



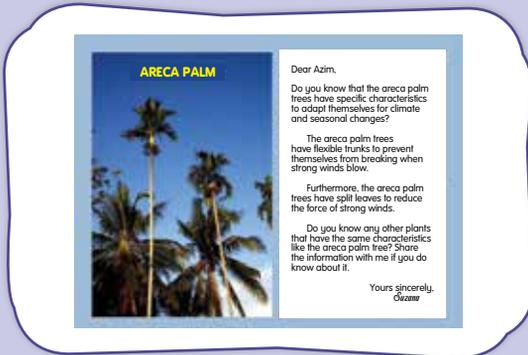
STEPS

1. Use the internet to find information on plants and their specific characteristics to protect themselves from enemies.
2. Download the information and pictures.



3. Make a digital postcard using the downloaded pictures and information.

4. Keep the digital postcard made in a folder.



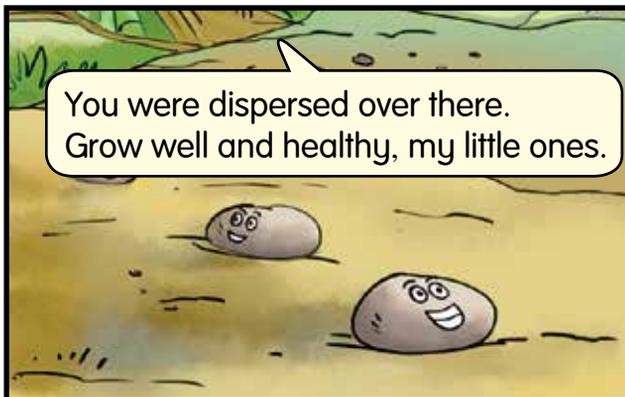
5. Upload the digital postcard on Google Classroom.



Describe the specific characteristics of the plant to adapt to climate and seasonal changes that you have chosen for your postcard.

DISPERSAL OF SEEDS OR FRUITS

Plants have various ways to disperse their seeds or fruits to ensure the survival of their species. Let us follow the story of the balsam parent plant and its seeds to know how plants disperse their seeds or fruits.



You were dispersed over there.
Grow well and healthy, my little ones.



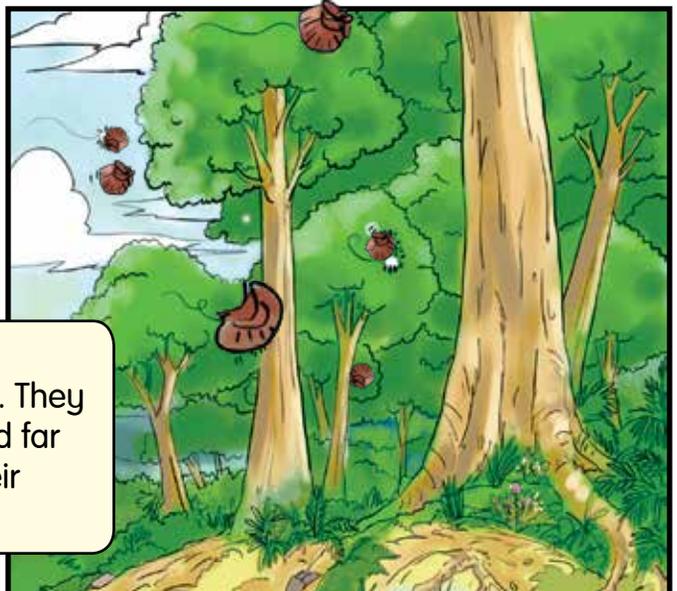
Good morning,
my children.

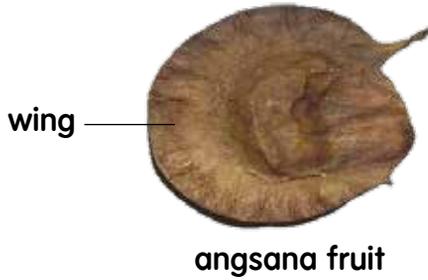
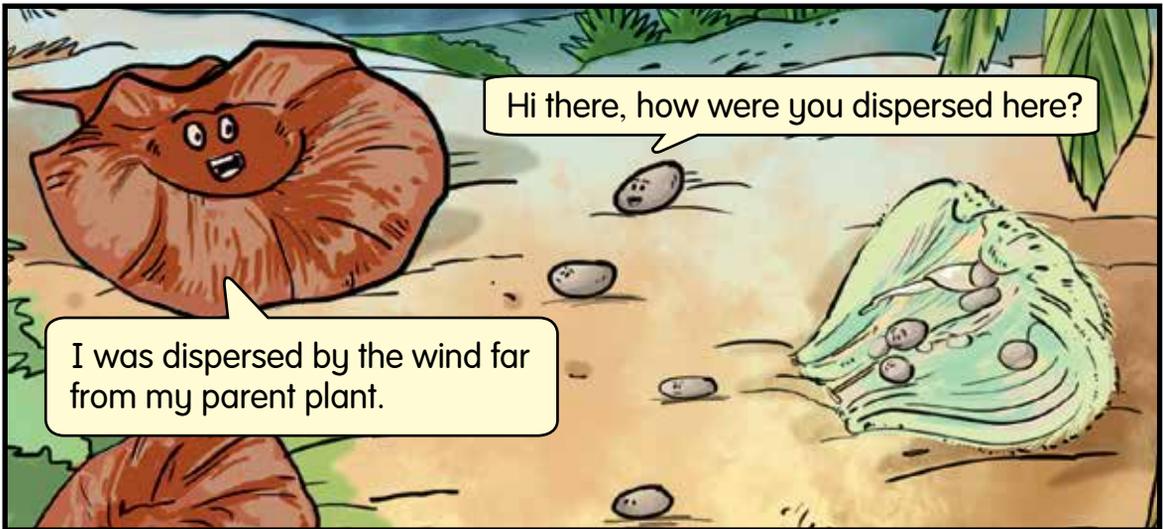
Good morning, mother.



Who are they?
What is happening
to them?

They are the
angsana fruits. They
were dispersed far
away from their
parent plants.

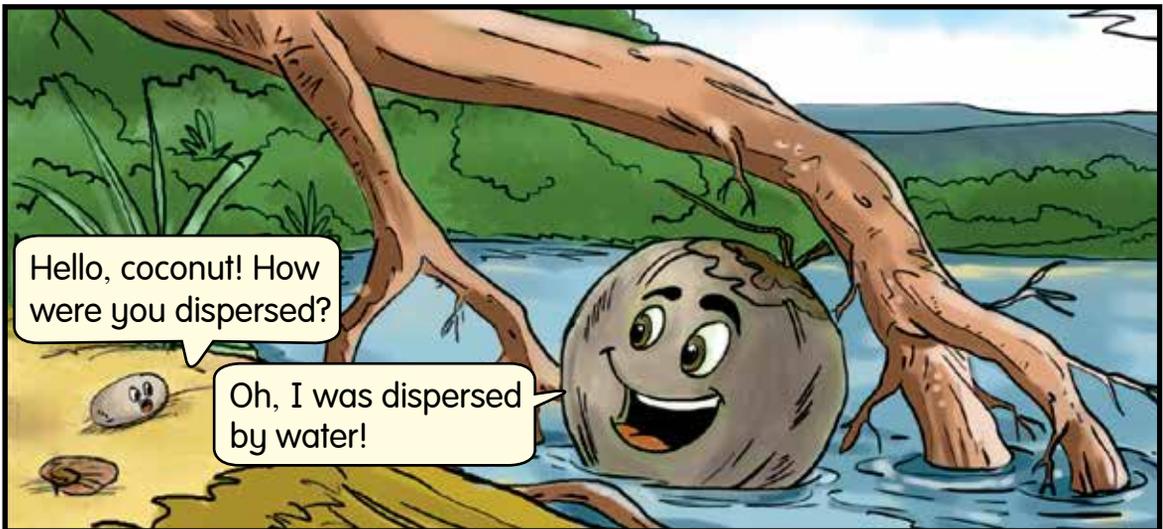




Dispersal by wind.

Characteristics of seeds or fruits:

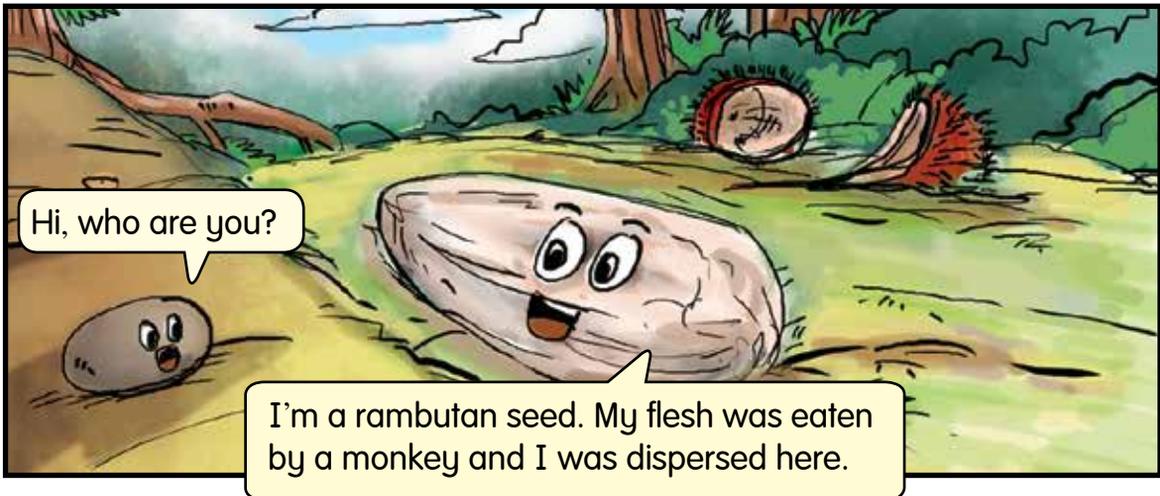
- small.
- thin.
- lightweight.
- wing-like structure.
- fine hairs.



Dispersal by water.

Characteristics of seeds or fruits:

- waxy skin.
- husk with air cavities.

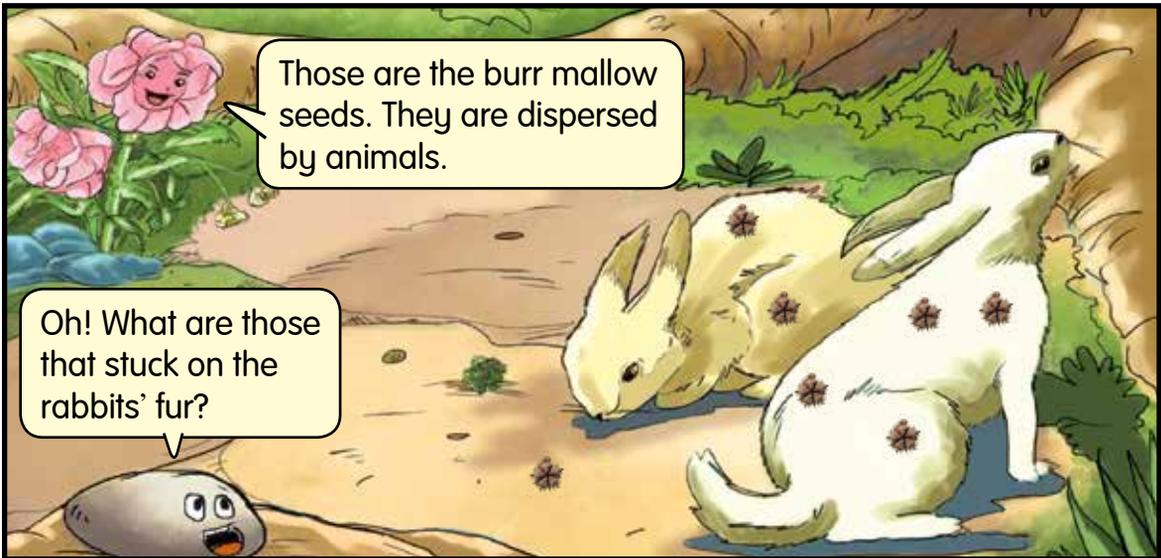


rambutan

Dispersal by animals and humans.

Characteristics of seeds or fruits:

- edible flesh.
- attractive colour.
- pleasant smell.



burr mallow seeds

Dispersal by animals and humans.

Characteristics of seeds or fruits:

- small.
- lightweight.
- have hooks.

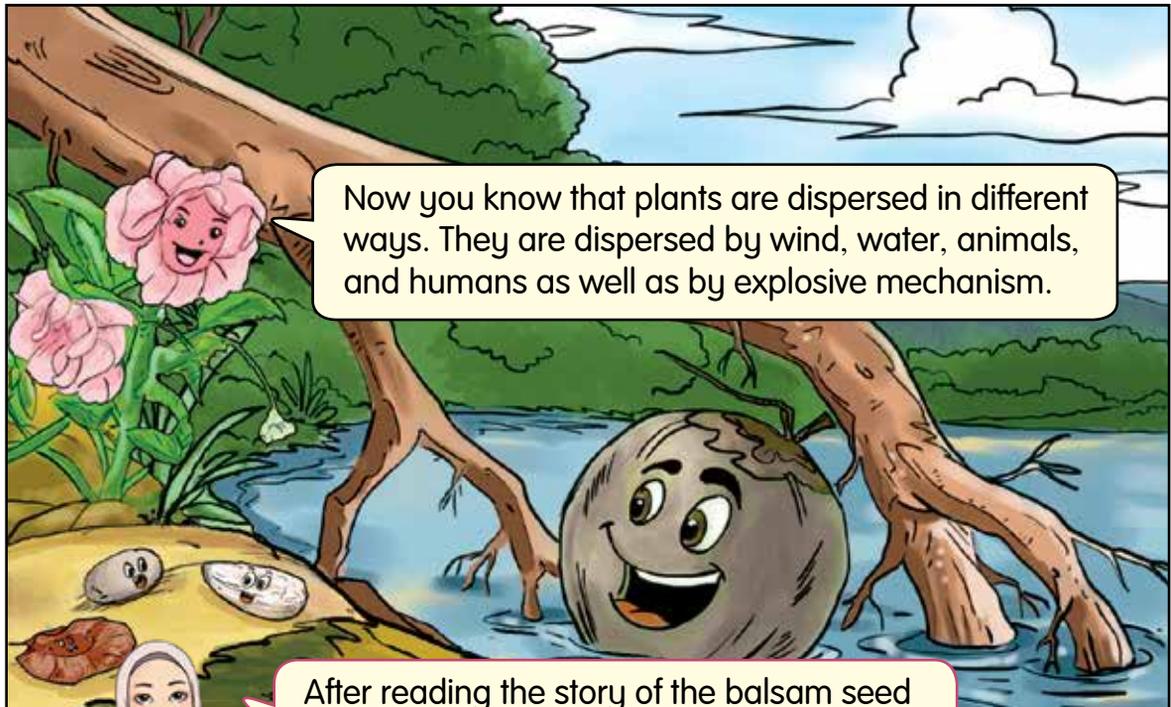


garden balsam seeds

Dispersal by explosive mechanism.

Characteristics of seeds or fruits:

- seed pods dry out.
- seed pods split open.



After reading the story of the balsam seed and its parent plant, state the different ways plants disperse their seeds or fruits.

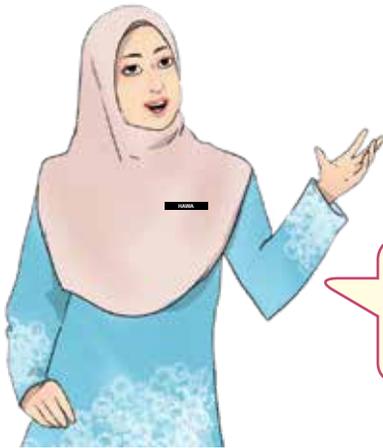
TEACHER'S NOTES

Seed pods are hard skin of the seeds that break when they mature.

All seeds and fruits are dispersed in various ways to ensure the survival of their species. Plants disperse their seeds or fruits by **wind**, **water**, **animals and humans** as well as by **explosive mechanism**.



Ways of dispersal of seeds or fruits



Based on the characteristics explained earlier, predict the ways these seeds and fruits are dispersed.



dandelion



nipa palm fruit



mangosteen



rubber fruit

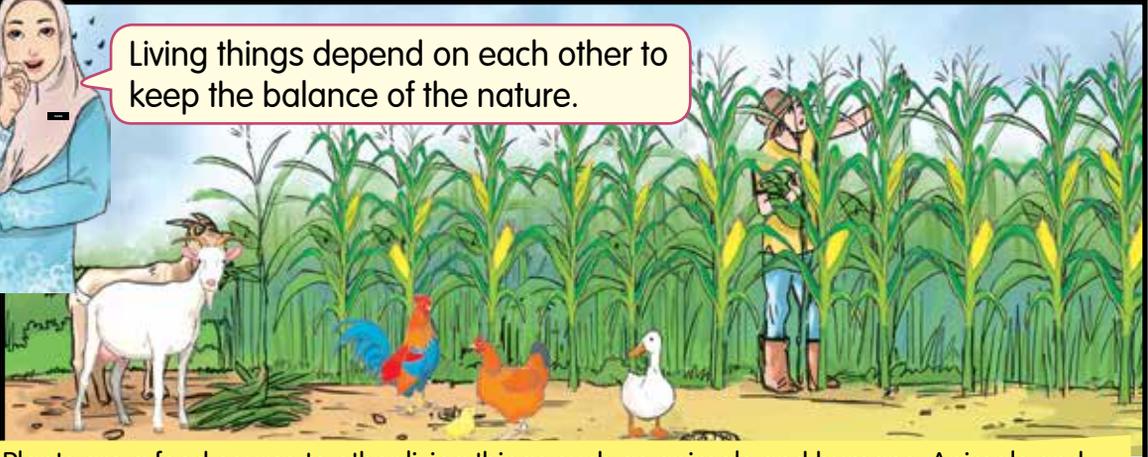


Plants need to disperse their seeds or fruits far from the parent plants. What type of dispersal method can disperse the seeds or fruits farthest from their parent plants? Why?

THE IMPORTANCE OF SURVIVAL FOR ANIMAL AND PLANT SPECIES



Living things depend on each other to keep the balance of the nature.



Plants are a food source to other living things such as animals and humans. Animals and humans in turn provide fertilizers and nutrients to plants through decaying process. Only some of the animal and human faeces can be made into fertilizers.



Living things such as animals and humans also ensure the survival of plants species by helping to disperse the seeds and fruits of the plants.



Animals make their nests using plants for protection. Plants also provide oxygen to other living things during photosynthesis.



The interaction between living things ensures the balance of the nature. What will happen if plants are unable to ensure the survival of their species?



FUN ACTIVITY

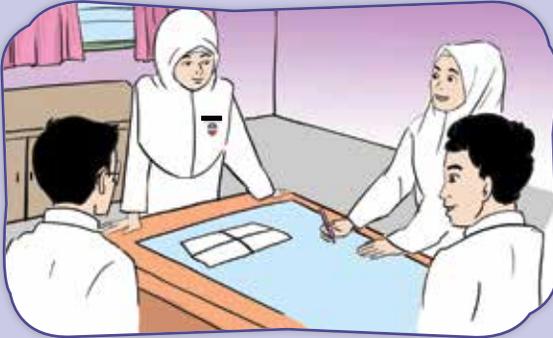
SEEDS AND WAYS OF DISPERSAL

APPARATUS AND MATERIALS

Marker pens, adhesive tape, and flip chart paper.



STEPS



1. Discuss the relationship between the characteristics of seeds and their ways of dispersal.



2. Construct a suitable mind map.



3. Display your work in front of the class.



4. Present your work in front of the class.



What is the relationship between the characteristics of the seeds or fruits with their ways of dispersal?



Durians have sharp thorns to protect themselves from animals and humans. However, animals and humans are also dispersal agents for durians. Why?





Create a simulation of seed dispersal by explosive mechanism using a filter funnel, sharp pencil, measuring tape, balloon, and 100 g of beads.

STEPS



1. Insert the end of the filter funnel into the balloon.



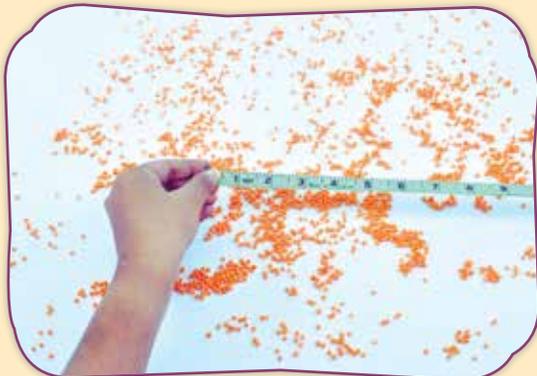
2. Pour 100 g of beads into the balloon using the filter funnel.



3. Blow air to inflate the balloon until it is big. Then, tie a knot.



4. Use the sharp pencil to poke the balloon.



5. Measure the distance the beads travelled from the spot where the balloon was popped.



MIND REFLECTION

1. Plants have specific characteristics to protect themselves from the enemies. The specific characteristics are:

- sharp thorns.
- produce latex.
- fine hairs.
- poisonous.
- bad smell.

2. Plants have specific characteristics to adapt themselves to climate and seasonal changes such as:

(a) strong seasonal wind

- flexible trunks and branches.
- split leaves.
- needle-shaped leaves.

(b) hot climate and dry season

- modified leaves as spikes.
- water storing stems.
- long roots.
- fine hairs.
- rolling leaves.
- waxy leaves.
- shedding leaves.

(c) cold climate

- thick bark.
- needle-shaped leaves.

3. Ways of dispersal and characteristics of seeds or fruits are:

(a) wind

- small.
- thin.
- lightweight.
- wing-like structure.
- fine hairs.

(b) water

- waxy skin.
- husk with air cavities.

(c) animals and humans

- edible flesh.
- attractive colour.
- pleasant smell.
- have hooks.
- small.
- lightweight.

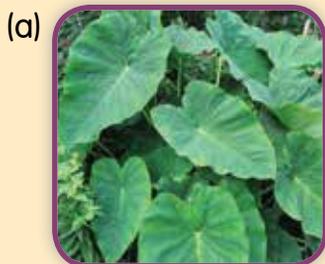
(d) explosive mechanism

- seed pods dry out.
- seed pods split open.

MIND TEST

Answer all questions in the Science exercise book.

1. Observe the pictures below. State the specific characteristics of the plants to protect them from the enemies.



yam plant



citronella plant



poison ivy

2. State the specific characteristics of plants based on the given situations to adapt themselves to climate and seasonal changes.



Bamboo trees can survive in areas with strong winds.



Pine trees can survive in cold weather.

3. The following plants have different ways of seeds or fruits dispersal. State their ways of dispersal.



okra seed



burr mallow seed



dandelion seed



lotus seed

4. Observe the picture below.



papaya

(a) What are the specific characteristics of the papaya fruits or seeds with their way of dispersal?

(b) Predict the way of dispersal for the papaya fruits or seeds.

5. Answer the riddles below on the way seeds or fruits are dispersed.
Predict the following seeds or fruits.

(a) I am light enough to float on water,
Soft and waxy, my skin won't falter;
My fibrous husk is filled with air,
Take a guess what I am, oh do be fair.

Way of seed or fruit dispersal:

Predicted seed or fruit:

(b) The colour of my skin is very pretty,
I smell sweet, as you will agree;
My flesh is delicious, you cannot resist,
Please go ahead and guess, I do insist.

Way of seed or fruit dispersal:

Predicted seed or fruit:

(c) Living in a seed pod, we have to endure,
Once it is dried, we are all so mature;
When it splits open, off we are scattered,
If you know what we are, we would
be so delighted.

Way of seed or fruit dispersal:

Predicted seed or fruit:

(d) Lightweight and small with hooks all around,
I am not brightly coloured, dull it may sound;
Nor am I fleshy as I would like to be,
But I get the job done, can you guess what
could be me?

Way of seed or fruit dispersal:

Predicted seed or fruit:

(e) We are small in size and lightweight too,
With these thin wings, we can just fly through;
Just like a loose kite, we can go quite far,
Give it a guess, do you know what we are?

Way of seed or fruit dispersal:

Predicted seed or fruit:



Observe the situations above. Why do they happen?

SOURCES OF ELECTRICAL ENERGY

We use electrical energy every day. Electrical energy is used to produce light, heat, sound, and to move objects. What are the sources for electrical energy?



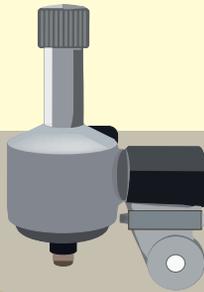
POWER PLANT

Power plants use kinetic energy produced from winds, waves, and hydroelectric to move turbines and generate electricity.



SOLAR CELL

Solar cells convert light energy from the Sun into electrical energy. Solar cells are also used in satellites and calculators.



DRY CELL

Dry cells store chemical energy. The chemical energy is converted into electrical energy to move tools such as toy cars. Dry cells are often used because of their small size and easy to bring everywhere.

DYNAMO

When wheels rotate, a small wheel of the dynamo also rotates. The dynamo converts kinetic energy into electrical energy that can light up a bicycle light.

ACCUMULATOR

Accumulators convert chemical energy into electrical energy. It is used to start up vehicles such as cars.

GENERATOR

Generators convert chemical energy from fossil fuels into electrical energy.

Explain the examples of sources for electrical energy.



TEACHER'S NOTES

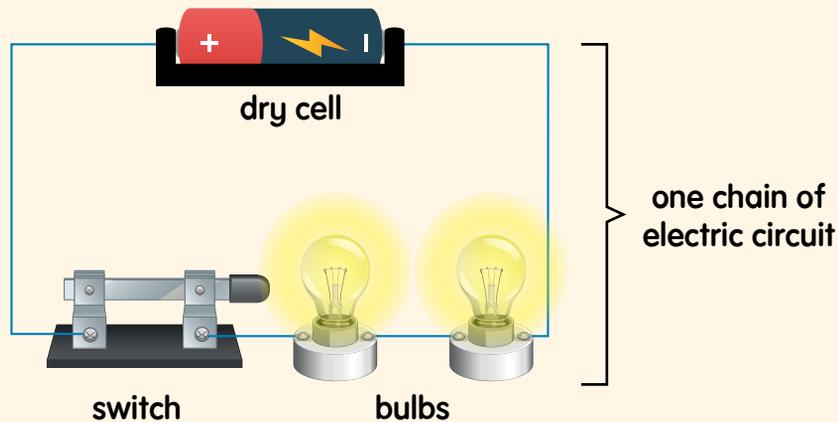
Energy from the Sun is also known as solar energy.

SERIES CIRCUIT AND PARALLEL CIRCUIT

Bulbs and other electrical components can be connected into two types of circuits. They are series circuit or parallel circuit.

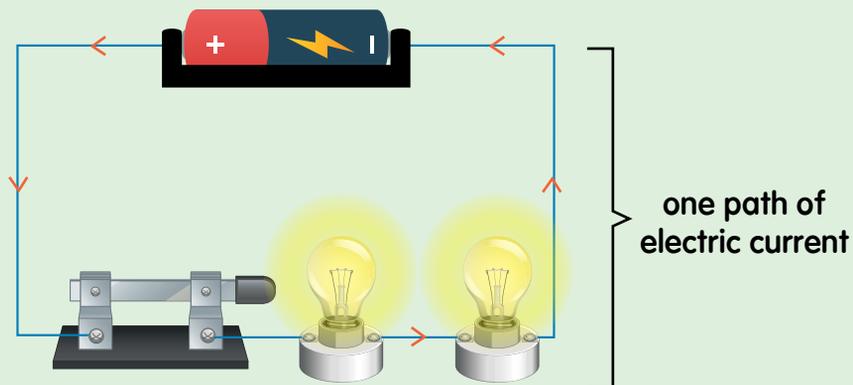
SERIES CIRCUIT

In a series circuit, each bulb is arranged in one chain.



Based on the arrangement of the circuits that you have learned, how many paths for the electric current to flow in series and parallel circuits?

Series circuit has a single path for the electric current to flow.

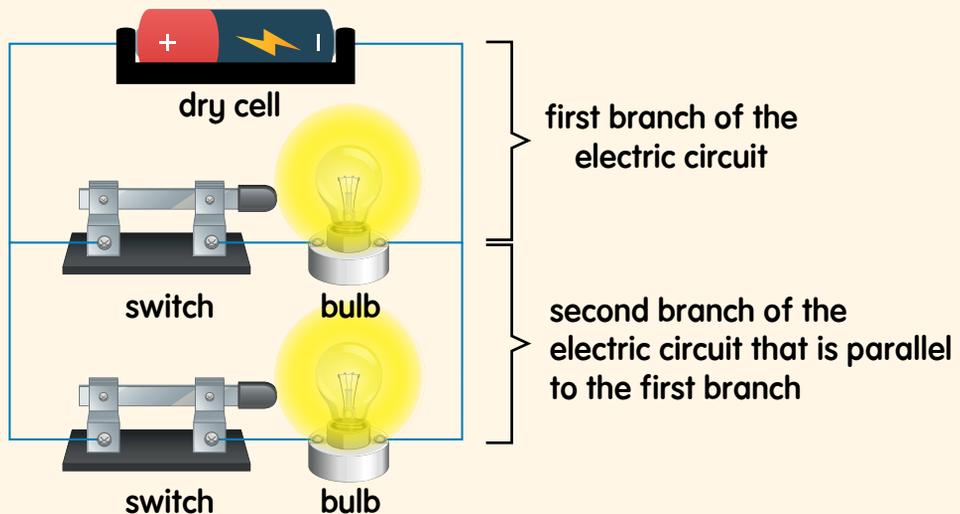


Observe the circuit below. What is the difference between the arrangement of bulbs in series and parallel circuits in a complete circuit?

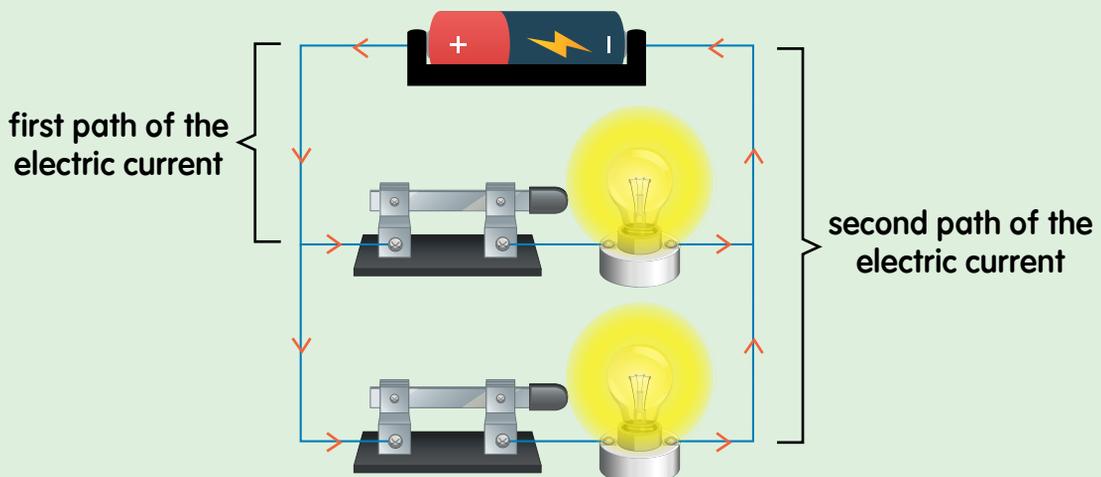


PARALLEL CIRCUIT

In a parallel circuit, each bulb is arranged in several branches that are parallel to each other.



The electric current in parallel circuit can flow in more than one path.



SKETCHING USING SYMBOLS

In a circuit diagram, electrical symbols are used to represent the components in an electric circuit.

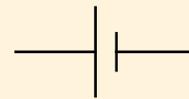
Let's look at the symbols for the components in an electric circuit.



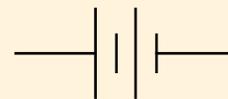
COMPONENT

SYMBOL

Dry cell

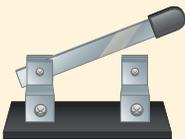


1 dry cell



2 dry cells

Switch



open switch



closed switch

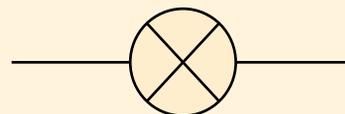


open switch

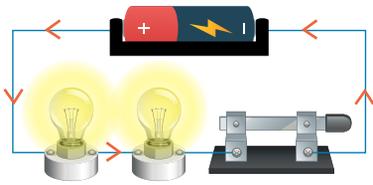


closed switch

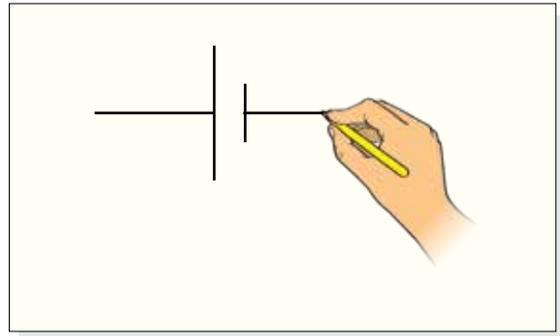
Bulb



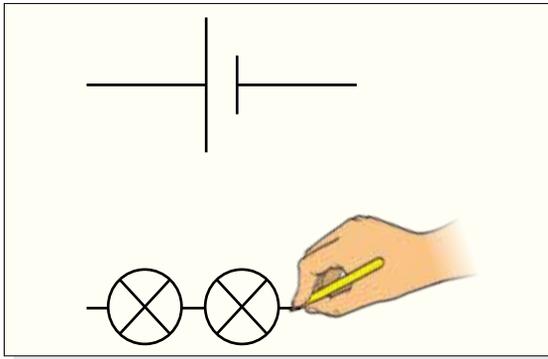
Sketching using the electrical symbols is easier to understand as compared to using the pictures of actual components. It shows the connections of the electrical components more clearly.



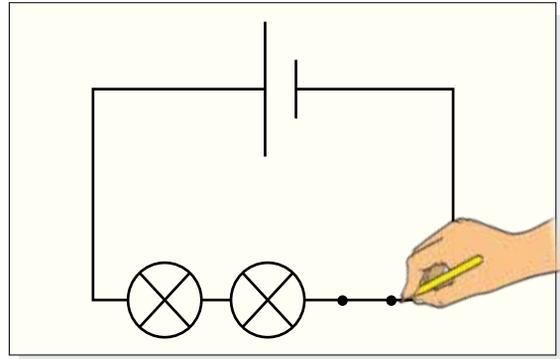
Let's sketch the diagram for this series circuit.



1. Sketch the symbol of the dry cell.

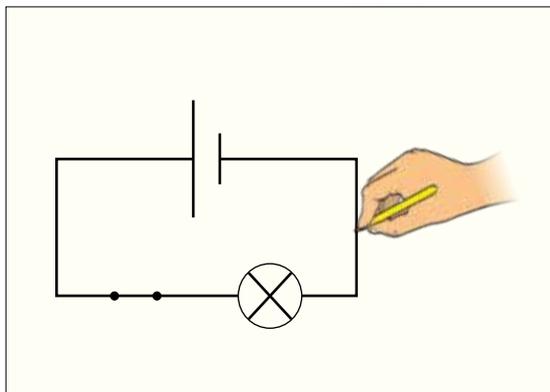
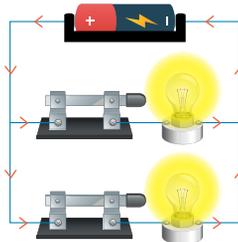


2. Then, sketch the symbol of the bulbs.

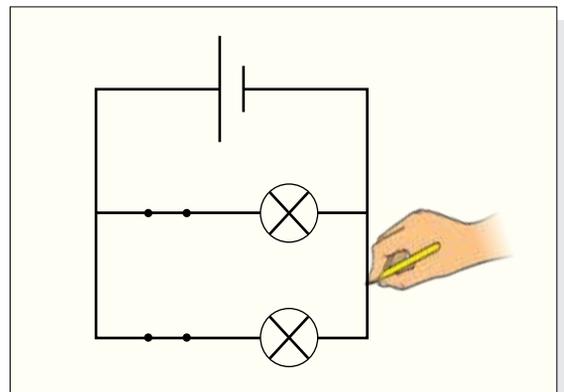


3. Sketch a linear connection between the dry cell and the bulbs. Lastly, insert the symbol for the switch.

How do I sketch the parallel circuit?



1. Sketch the first branch of the electric circuit.



2. Then, sketch the second branch of the electric circuit in parallel.



FUN ACTIVITY

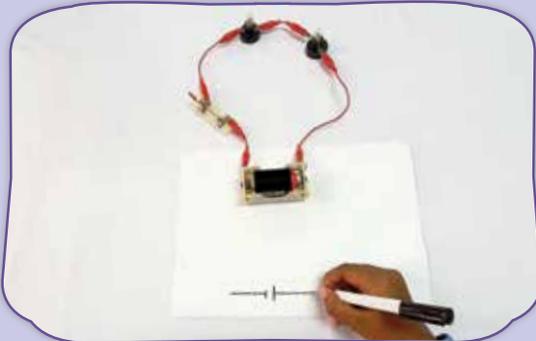
SKETCHING ELECTRIC CIRCUIT DIAGRAMS USING SYMBOLS



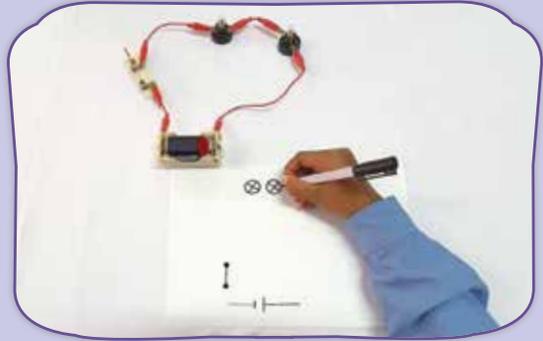
APPARATUS AND MATERIALS

Series circuit and parallel circuit arrangements, marker pen, A4 paper, and ruler.

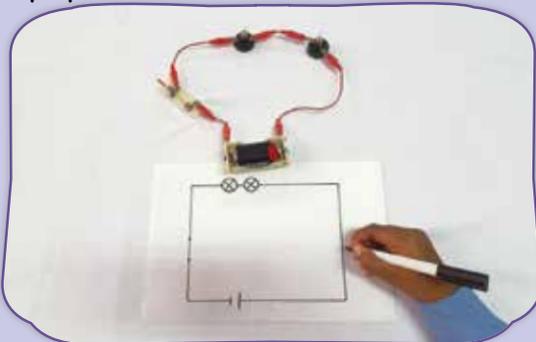
STEPS



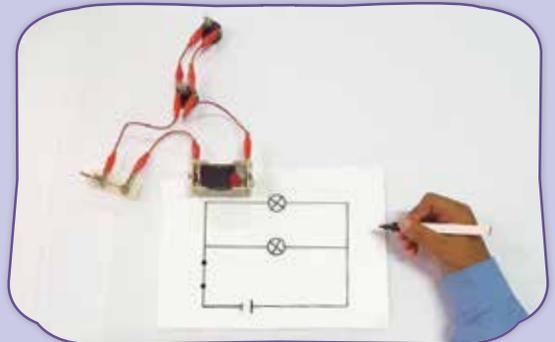
1. Observe the arrangement of the series circuit. Then, sketch the symbol for the dry cell on the A4 paper.



2. Take turns to sketch the symbol for each dry cell, switch, and the bulbs in the series circuit.



3. Connect the symbols of the components with the symbol of the connecting wire in linear lines.



4. Repeat steps 1 to 3 for parallel circuit arrangement.

5. Share the sketch of the circuit diagrams of your group in front of the class.

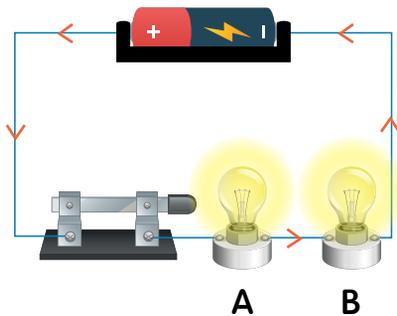


- (a) Explain all the symbols for the electrical components that you have sketched.
- (b) Compare the positions of the actual components with the sketched symbols in the circuits. Are the connections of the components shown clearly?

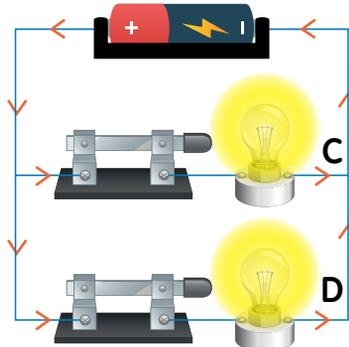
THE BRIGHTNESS OF BULBS



What is the difference in the brightness of the bulbs between the series and parallel circuits?



Series Circuit

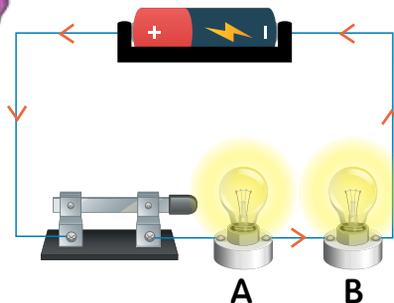


Parallel Circuit

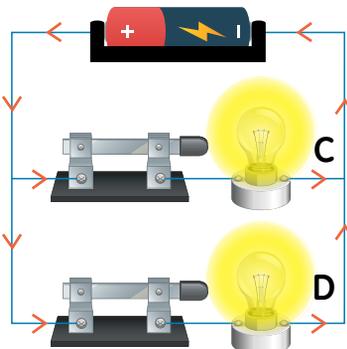
Wow! It looks like the bulbs arranged in the parallel circuit are brighter than the bulbs arranged in the series circuits.



Why do the bulbs arranged in the parallel circuit light brighter?



The series circuit has one path for the electric current to flow. All the bulbs share the electric current. This causes bulbs A and B to be dimmer than the bulbs arranged in the parallel circuit.



The parallel circuit has more than one path for the electric current to flow. The total electrical energy that flows through each path is the same. This causes bulbs C and D to be brighter than the bulbs arranged in the series circuit.



LET'S TEST

THE BRIGHTNESS OF BULBS



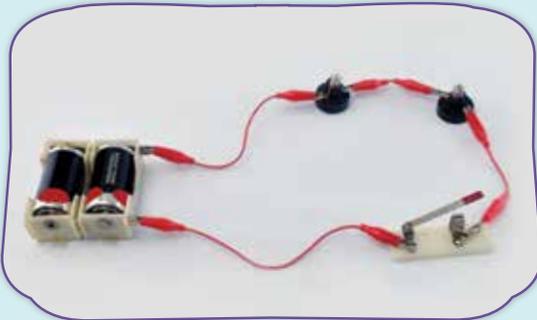
AIM

To investigate the relationship between types of circuit and the brightness of bulbs.

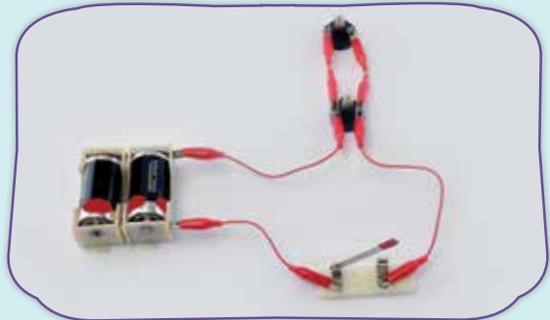
APPARATUS AND MATERIALS

Four bulbs, four bulb holders, four dry cells, four dry cell holders, two switches, and connecting wires with crocodile clips.

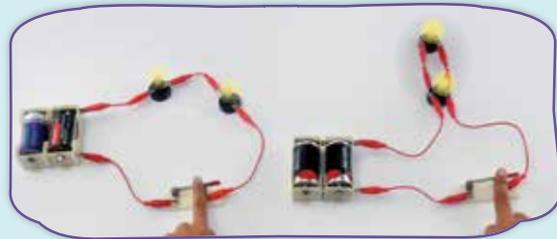
STEPS



1. Build a series circuit using two bulbs.



2. Then, build a parallel circuit using the same number of bulbs.



3. Close the switches in both circuits simultaneously.



4. Observe the brightness of the bulbs in both circuits.

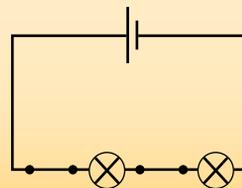


(a) What are your observations on the brightness of the bulbs in this activity? Explain.

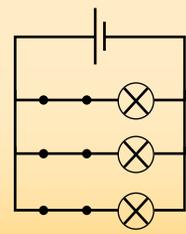
(b) What can you conclude from your observations?



Ozair arranges five bulbs for two different arrangement of circuits. Which circuit lights brighter bulbs? Why?



Circuit A

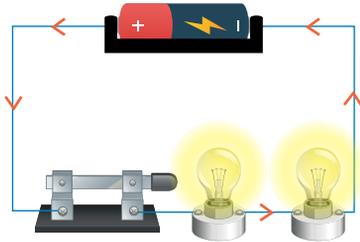


Circuit B

FACTORS AFFECTING THE BRIGHTNESS OF BULBS

IN SERIES CIRCUIT

NUMBER OF DRY CELL



Can we make the bulbs in this series circuit brighter?



If we increase the number of dry cells, the bulbs will light brighter.



Let's test this hypothesis by carrying out an experiment.

1. Aim

To determine the factors affecting the brightness of the bulbs in a series circuit.

2. Problem statement

Does the number of dry cells affect the brightness of the bulbs in a series circuit?

3. Hypothesis

As the number of dry cells increases, the brightness of the bulbs in a series circuit also increases.

4. Variables

- manipulated: number of dry cells.
- responding: brightness of the bulbs.
- constant: number of bulbs and type of circuit.

5. Apparatus and materials

Three bulbs, three bulb holders, six dry cells, six dry cell holders, three switches, and connecting wires with crocodile clips.

6. Steps

- (a) Build three series circuits as follows:
 - (i) A series circuit using a bulb and a dry cell.
 - (ii) A series circuit using a bulb and two dry cells.
 - (iii) A series circuit using a bulb and three dry cells.
- (b) Then, close the switches simultaneously.
- (c) Observe the brightness of the bulbs and record the results in the table as shown below.

7. Data

Number of dry cells	Brightness of bulbs		
	brightest	brighter	bright
1			
2			
3			

8. Conclusion

(a) Hypothesis is (accepted/not accepted).

(b) As the number of dry cells , the brightness of the bulbs also .

NUMBER OF BULB

Melia, in your opinion, does the brightness of the bulbs increase by increasing the number of bulbs in this series circuit?



No, Chan. In my opinion, the brightness of the bulbs in a series circuit will decrease if the number of bulbs increases.

Let's carry out the experiment again to prove the hypothesis above.

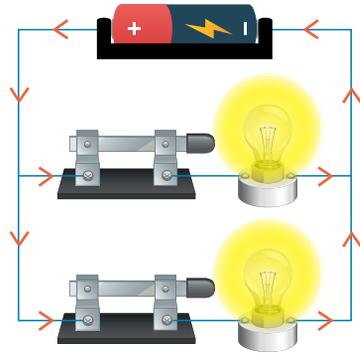


IN PARALLEL CIRCUIT

NUMBER OF DRY CELL

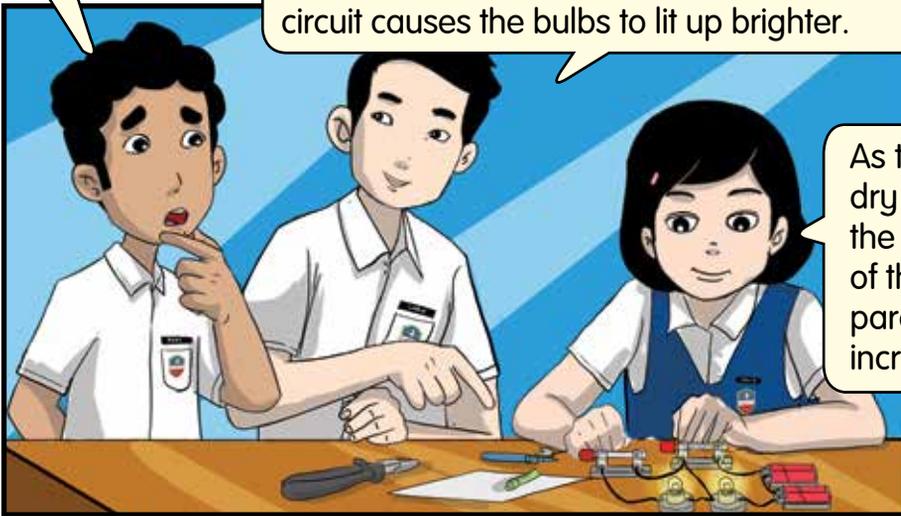


Does the number of dry cells affect the brightness of the bulbs in a parallel circuit?



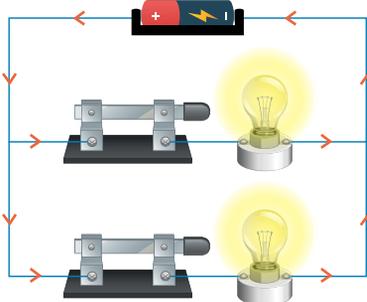
How do we change the brightness of the bulbs in a parallel circuit?

The brightness of the bulbs can be changed by adding more dry cells. The increase in the number of dry cells will provide more electrical energy to the circuit. The increased amount of electric current that flows in each branch of the circuit causes the bulbs to lit up brighter.



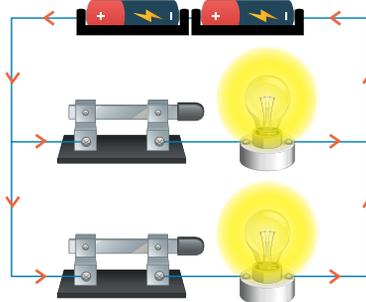
As the number of dry cells increases, the brightness of the bulbs in a parallel circuit also increases.

one dry cell



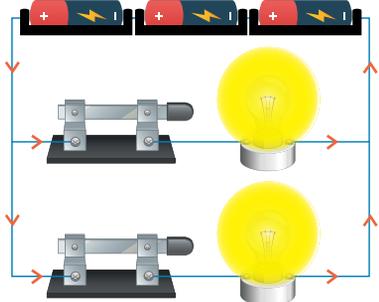
Circuit A

two dry cells



Circuit B

three dry cells



Circuit C



Based on Circuits A, B and C, plan an experiment to investigate whether the number of dry cells affects the brightness of the bulbs in a parallel circuit.

NUMBER OF BULB

Ana, in your opinion, does the brightness of the bulb in a parallel circuit decrease if the number of bulbs increases?



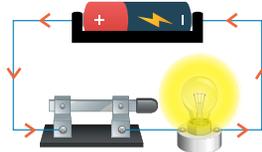
I don't think so, Ravi. A parallel circuit has more than one path for the electric current to flow. Therefore, the total amount of electricity that flows in each path is the same.

I agree with you, Ana. When the number of bulbs increases, the brightness of the bulbs in a parallel circuit does not change.



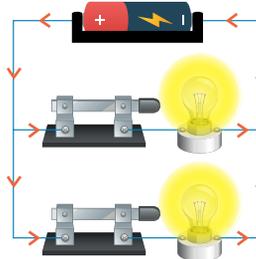
You can carry out an experiment to prove the hypothesis.

one bulb



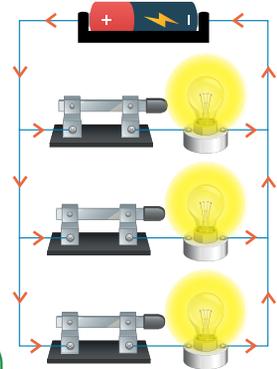
Circuit A

two bulbs



Circuit B

three bulbs



Circuit C

Wow, the bulbs in all three parallel circuits have the same brightness!



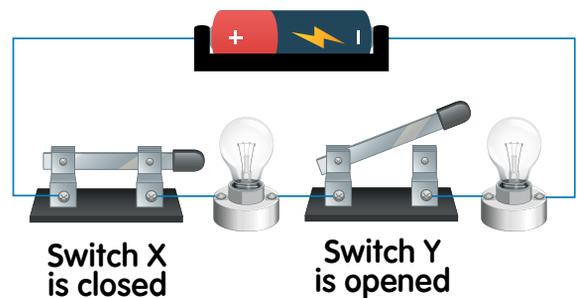
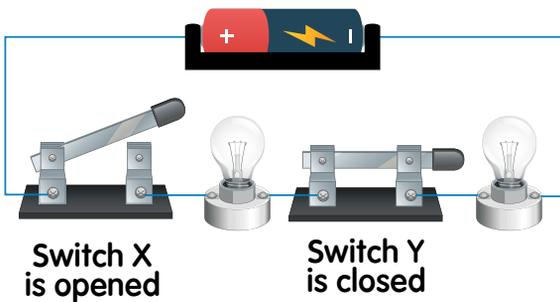
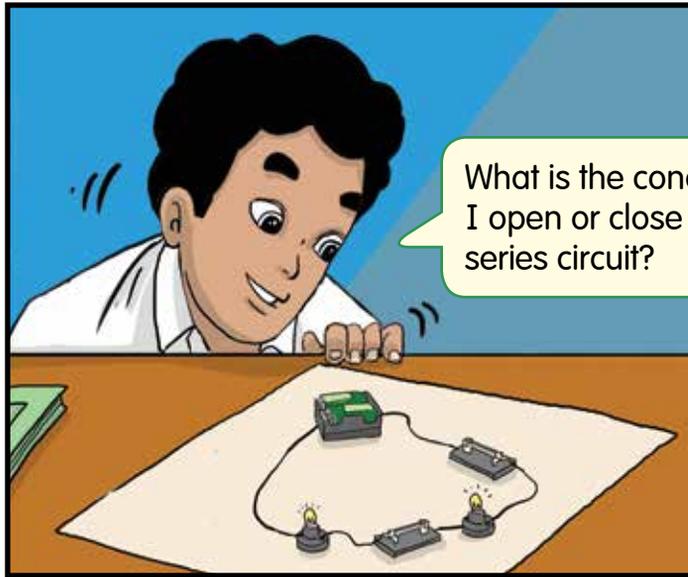
This proves that when the number of bulbs increases, the brightness of the bulbs in a parallel circuit does not change.

What is your conclusion about the factors affecting the brightness of bulbs in series and parallel circuits?



CLOSED SWITCH, OPEN SWITCH

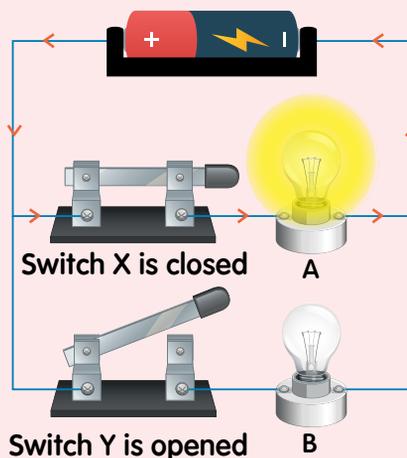
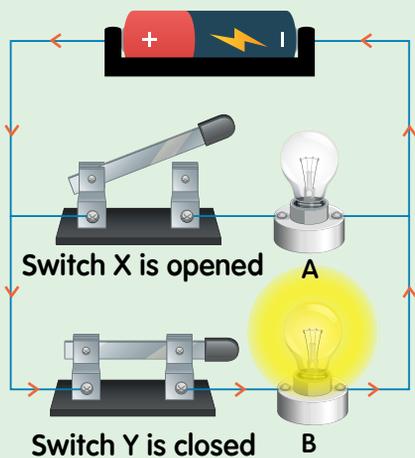
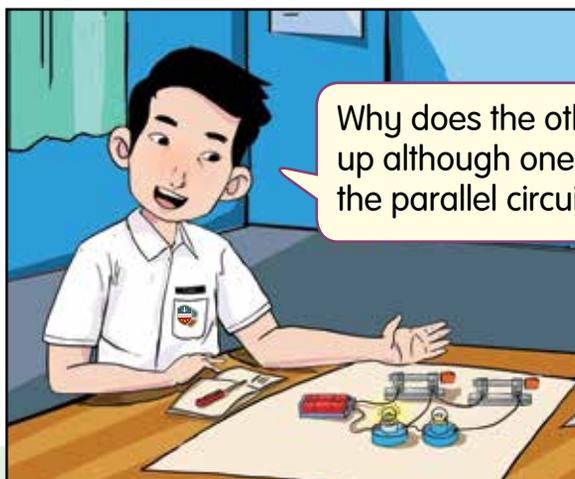
Ravi has built a series circuit. He has connected two switches in the circuit to observe the condition of the bulbs when these switches are closed or opened.



Why do both bulbs in this series circuit not light up if one of the switches is opened?

When either switch X or Y is opened, both bulbs do not light up. This is because the circuit has become an incomplete circuit and electric current cannot flow.

Chan also tested the condition of the bulbs when one of the switches is opened or closed in the parallel circuit that he has built.



When switch X in the first branch of the electric circuit is opened, bulb A in the first branch does not light up because the circuit on this branch becomes an incomplete circuit and the electric current cannot flow through it.

When switch Y in the second branch of the electric circuit is opened, bulb B in the second branch does not light up because the circuit on this branch becomes an incomplete circuit and the electric current cannot flow through it.

Bulb B in the second branch of the electric circuit still lights up because electric current can flow through this branch.

Bulb A in the first branch of the electric circuit still lights up because electric current can still flow through this branch.





LET'S TEST

CLOSE THE SWITCH, OPEN THE SWITCH



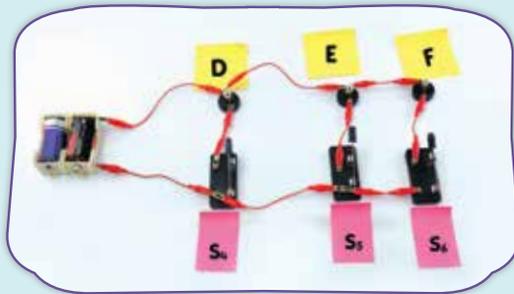
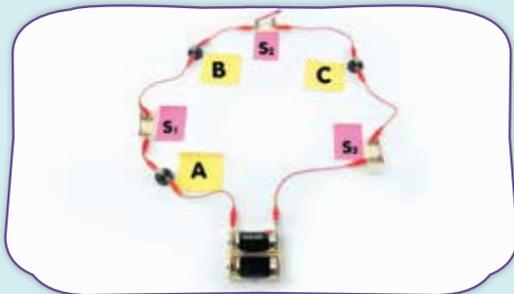
AIM

To investigate the relationship between the conditions of switches and bulbs.

APPARATUS AND MATERIALS

Six bulbs, six bulb holders, four dry cells, four dry cell holders, six switches, and connecting wires with crocodile clips.

STEPS



1. Build a series circuit using three bulbs and three switches. Label the bulbs as A, B, C and the switches as S_1 , S_2 , S_3 .
2. Build a parallel circuit using three bulbs and three switches. Label the bulbs as D, E, F and the switches as S_4 , S_5 , S_6 .
3. Close the switches in both circuits simultaneously.
4. Then, open and close the switches by following the instructions in the table as shown below. Record your observations.

Circuit	Condition of switches			Condition of bulbs		
	S_1	S_2	S_3	A	B	C
Series circuit	close	open	open	does not light up	does not light up	does not light up
	open	close	open			
	open	open	close			
Parallel circuit	S_4	S_5	S_6	D	E	F
	close	open	open			
	open	close	open			
	open	open	close			



- (a) State the condition of the bulbs if S_1 is closed while S_2 and S_3 are opened. Give an inference to your observation.
- (b) Which bulb will light up if S_5 is closed while S_4 and S_6 are opened?

FACTORS AFFECTING THE USAGE OF ELECTRICAL ENERGY

Electrical energy makes our life easier and comfortable. The mishandling of electrical appliances causes higher usage of electrical energy. We have to pay the cost of the electrical energy used. Using electrical energy wisely can reduce our monthly electricity bill.



Using a fan instead of an air conditioner.

Switching off the lights when sleeping.

Switching off electrical appliances when not in use.

Avoid leaving the refrigerator door open for a long time.



What are the factors affecting the usage of electrical energy?

Legend:



Type of electrical appliance used



Duration of using the electrical appliance

SCIENCE INFO

Green technology is a method to make or manufacture sustainable products using recyclable and environmentally friendly sources that do not cause pollution. An example of green technology is the light-emitting diode (LED) lamp that is used to reduce the usage of electrical energy.

Reduce the usage of water heater when showering.



LED lamp

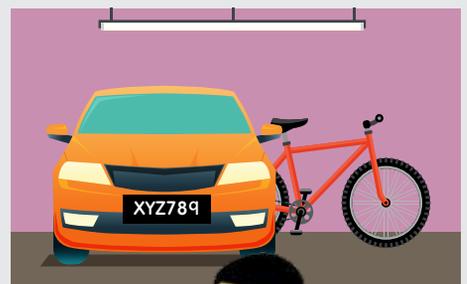


compact fluorescent lamp

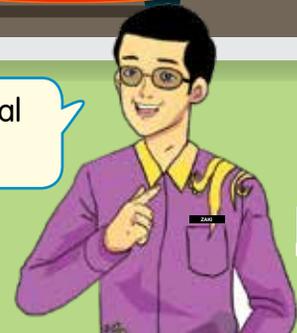


filament lamp

Using energy-saving lamps such as LED lamp and compact fluorescent lamp instead of filament lamp.



State ways to reduce the usage of electrical energy in the situation above.





FUN ACTIVITY

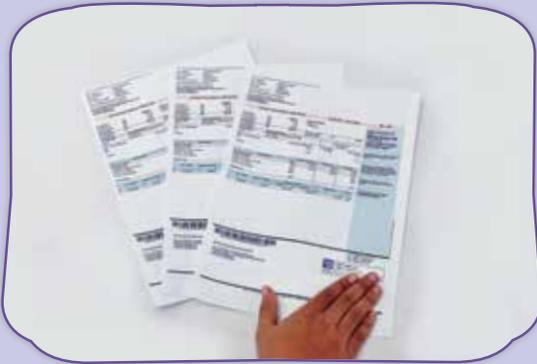
ANALYSING THE USE OF ELECTRICAL ENERGY AT HOME



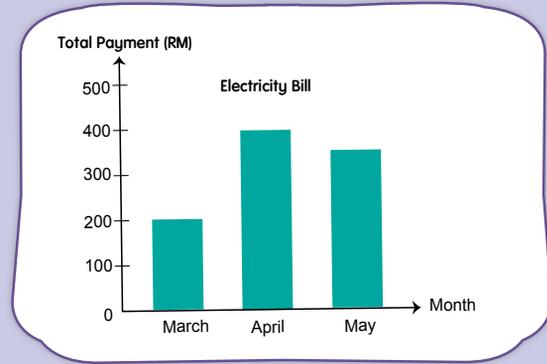
APPARATUS AND MATERIALS

Copies of the monthly electricity bill.

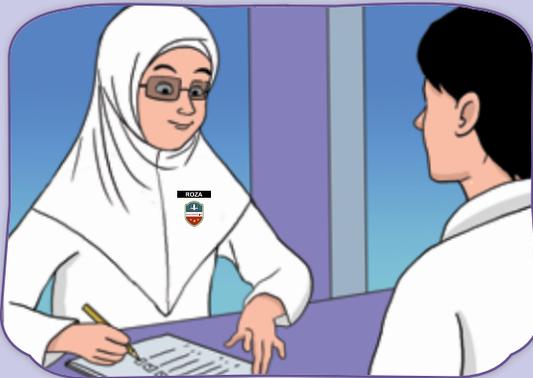
STEPS



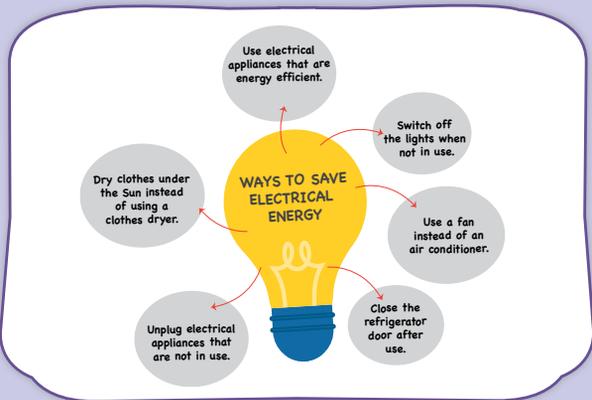
1. Gather the electricity bills of your friend's house for the past several months.



2. Observe the total amount paid for each month. Build a bar chart based on the gathered information.



3. Gather information about how the electrical appliances were used through an interview or a house visit.

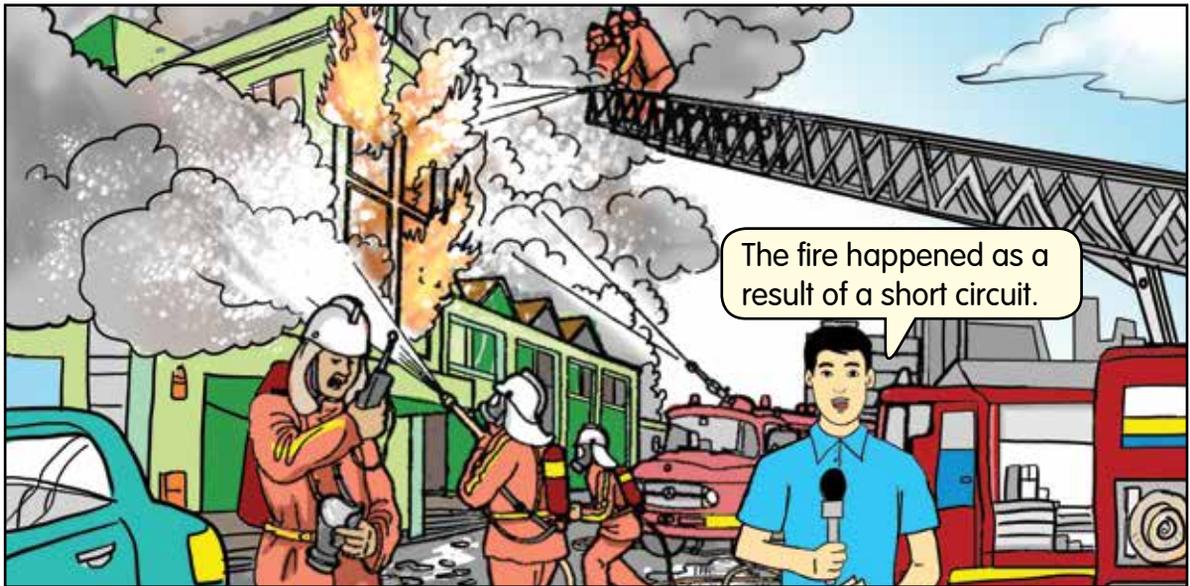


4. Suggest ways to save electrical energy in a house in the form of a mind map.



State ways to reduce the usage of electrical energy in a house.

MISHANDLING OF ELECTRICAL APPLIANCES



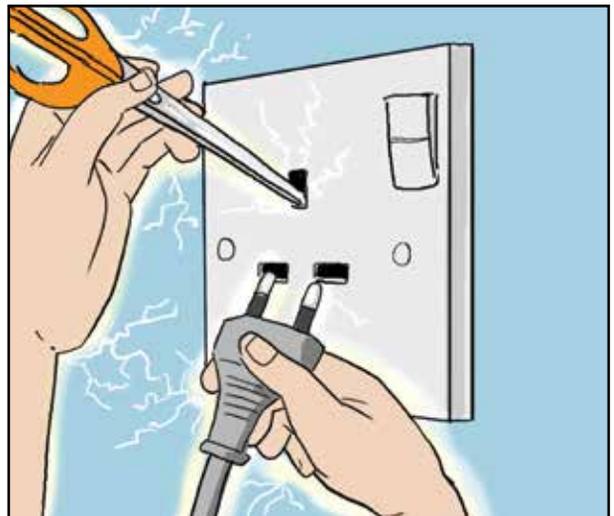
Electricity has various uses. However, mishandling electrical appliances is very dangerous.

The following are examples of mishandling of electrical appliances.

Electrocution

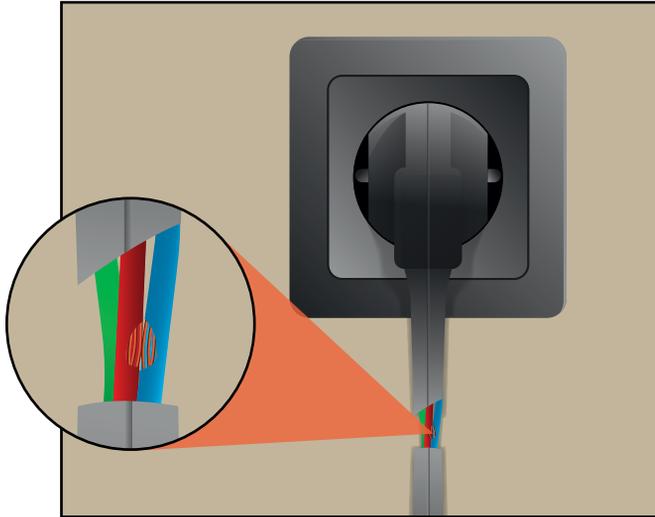


Touching a switch or an electrical appliance with a damp or wet hand.

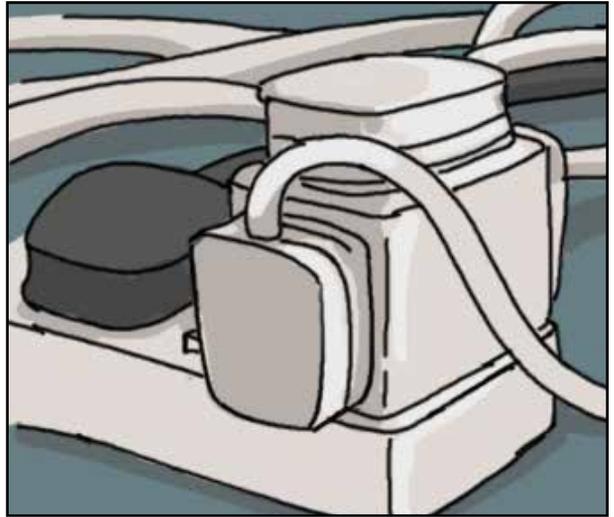


Inserting an object that conducts electric current into the socket.

Short circuit



Using an electrical appliance with a damaged wire.



Connecting too many plugs in a socket.

Fire



Mishandling of an electrical appliance.



Charging an electrical appliance for too long.



Siti covers a light bulb using a towel to make the light dimmer in her room. Based on her action, what is the effect that could happen?

HANDLING ELECTRICAL APPLIANCES SAFELY

If we got electrocuted by a large amount of electric current, we may experience injury and it can be fatal. Therefore, we must practise safety precautions when handling electrical appliances.



How do we use electrical appliances safely?



Faulty electrical appliances should be repaired by certified personnel.



Hands must be dry when touching a switch.



Connect only one plug to one socket.



Turn off the switch before removing the plug from the socket.



Replace a damaged wire with a new one.



FUN ACTIVITY

SAFETY CARD AND SAVING ELECTRICAL ENERGY



APPARATUS AND MATERIALS

Computer, internet access, scissors, glue, manila card, and adhesive tape.

STEPS



1. Identify the places with electrical appliances in your school such as the canteen, computer laboratory, and library. Mark the locations of the electrical appliances using adhesive tape.



2. Use the computer and the internet to gather information about the safety precautions and ways to save energy when handling these electrical appliances. Print the gathered information.



3. Cut the manila card into smaller cards. Paste the gathered information onto these cards to make cards on safety precautions and saving electrical energy.



4. Paste the safety cards on the marked locations. Present your work to other groups.



Explain the safety precautions needed when handling the electrical appliances.



FUN SCIENCE

CIRCUIT BOARD QUIZ

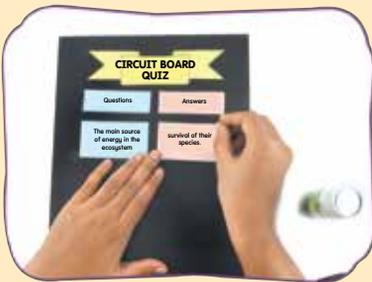
Construct a circuit board quiz using a mounting board, coloured paper, paper clips, adhesive tape, connecting wires with crocodile clips, dry cells, bulbs, dry cell holders, hole puncher, and glue.



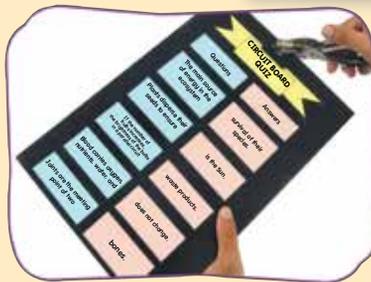
Circuit board quiz

CIRCUIT BOARD QUIZ	
Questions	Answers
The main source of energy in the ecosystem	survival of their species.
Plants disperse their seeds to ensure	is the Sun.
If the number of bulbs increases, the brightness of the bulbs in a parallel circuit	waste products.
Blood carries oxygen, nutrients, water, and	does not change.
Joints are the meeting point of two	bones.

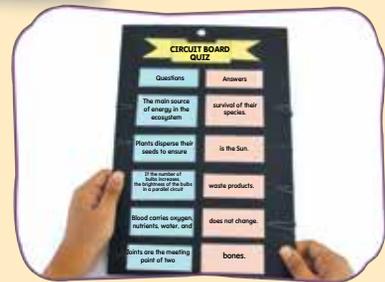
STEPS



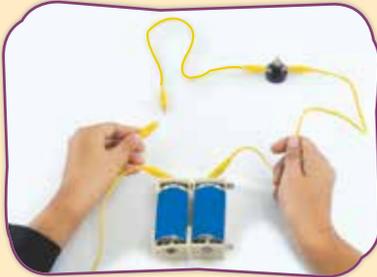
1. Prepare written or printed questions and answers for the quiz. Paste the questions and answers randomly on the mounting board.



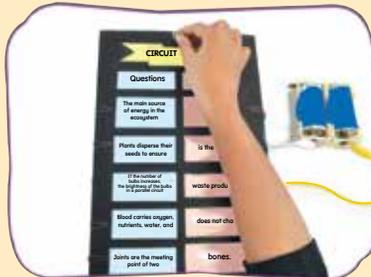
2. Make a hole on the top part of the mounting board.



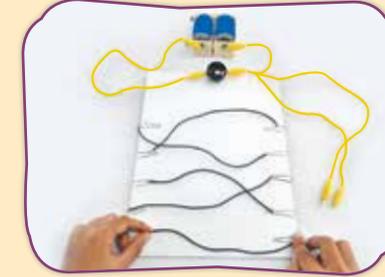
3. Using the paper clips, clip one side of each coloured paper with the questions and answers.



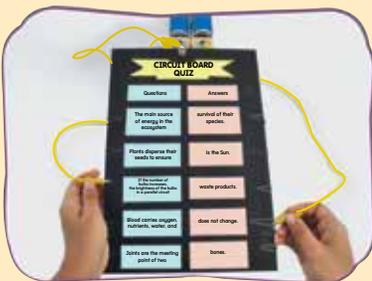
4. Build an electric circuit using the connecting wires with crocodile clips as shown above.



5. Insert the bulb through the hole from the back of the mounting board. Fasten it using the adhesive tape.



6. Connect the paper clips for a question to the respective correct answer using the connecting wires at the back of the mounting board.

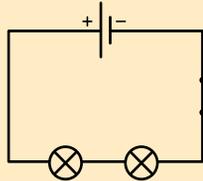


7. Touch one end of the crocodile clip to the paper clips for the questions. Touch the other end of the crocodile clip to the paper clips for the answers.

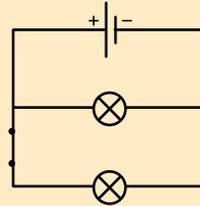


MIND REFLECTION

- The sources of electrical energy are from solar cells, dry cells, dynamos, accumulators, generators, and power plants that use winds, waves, and hydroelectric.
- Bulbs can be arranged in series or parallel circuits.
- Examples of sketches of series and parallel circuits using symbols are as follows:

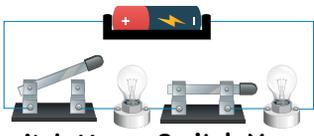
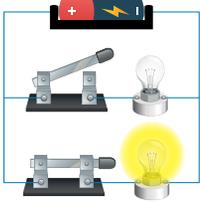


The sketch of a series circuit



The sketch of a parallel circuit

- The brightness of bulbs in a circuit can be changed by:
 - changing the number of bulbs or the number of dry cells in a series circuit.
 - changing the number of dry cells in a parallel circuit.
- The differences in the condition of the bulbs between series and parallel circuits when a switch is opened are as follows:

Series circuit	Parallel circuit
 <p>Switch X is opened Switch Y is closed</p>	 <p>Switch X is opened Switch Y is closed</p>
All the bulbs do not light up.	The bulb in branch Y still lights up.

- Factors affecting the use of electrical energy:
 - Using a fan instead of an air conditioner.
 - Switching off the lights when sleeping.
 - Switching off electrical appliances when not in use.
 - Avoid leaving the refrigerator door open for a long time.
 - Reducing the usage of water heater when showering.
 - Using energy-saving lamps such as the LED lamp instead of filament lamp.

7. The effects of mishandling electrical appliances:

- electrocution.
- short circuit.
- fire.

8. The safety precautions when handling electrical appliances:

- Faulty electrical appliances should be repaired by certified personnel.
- Hands must be dry when touching a switch.
- Connect only one plug to one socket.
- Turn off the switch before removing the plug from the socket.
- Replace a damaged wire with a new one.

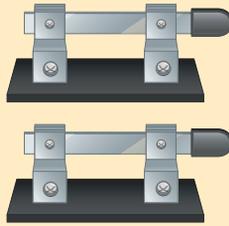
MIND TEST

Answer all questions in the Science exercise book.

1. State all the sources of electrical energy.
2. Observe the circuit components below.



bulbs



switches



dry cell

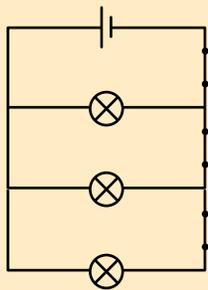


connecting wires
with crocodile clips

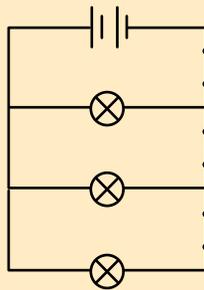
- (a) Using all the components above, sketch the circuit diagrams for two different circuits using symbols.
- (b) Which arrangement has brighter bulbs? Why?
- (c) Explain the difference in the arrangement of the bulbs in the series and parallel circuits in the table as shown below.

Circuit	Series	Parallel
Arrangement of bulbs		

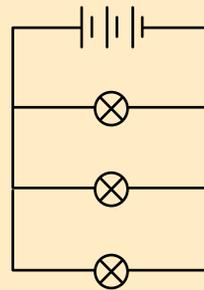
3. Ali is investigating the brightness of bulbs in parallel circuits.



Circuit A



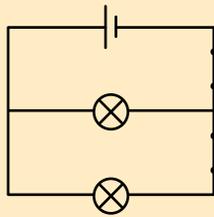
Circuit B



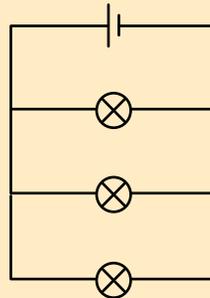
Circuit C

Based on the circuit diagrams above,

- what is the manipulated variable in this investigation?
- arrange the brightness of the bulbs in the three circuits in descending order.
- Ali then investigates another factor that affects the brightness of the bulbs in a parallel circuit. His investigation is shown in the diagrams below:



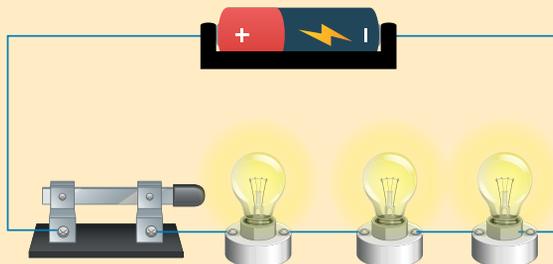
Circuit A



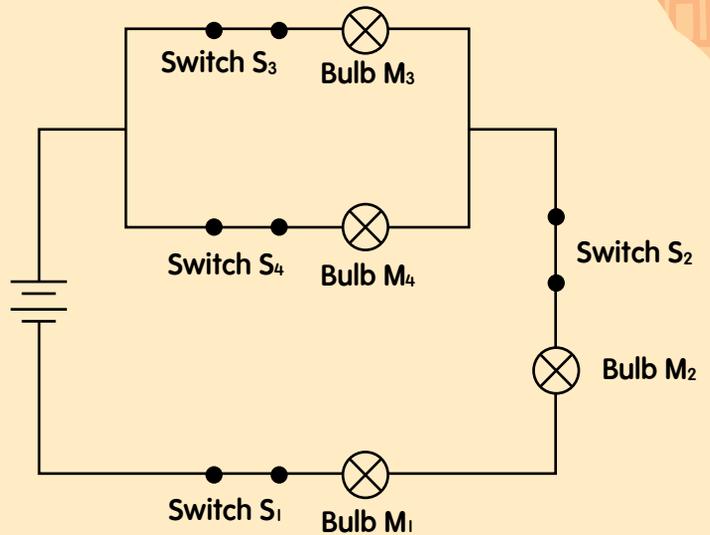
Circuit B

Based on the circuit diagrams above, is there any differences in the brightness of the bulbs in both circuits? Why?

4. Based on the circuit diagram below, suggest two ways to increase the brightness of the bulbs.



5. The diagram shows four bulbs that are arranged in parallel and series circuits. Each switch is closed. Based on the arrangement of the switches and bulbs in the diagram, state the condition of the bulb if one of the switches is opened.



- (a) Switch S_1
- (b) Switch S_2
- (c) Switch S_3

6. Observe the situation below on the usage of electrical energy in Ahmad's house.



List ways for Ahmad to reduce the usage of electrical energy at his house.

7. The situation below shows a mishandling of an electrical appliance.



- (a) What is the possible effect on the pupil?
- (b) How could the mishandling be avoided?
- (c) Give two safety precautions when handling electrical appliances.