SCIENCE YEAR 6

KEMENTERIAN PENDIDIKAN MALAYSIA

SCIENCE

YEAR 6

KURIKULUM STANDARD SEKOLAH RENDAH
KSSR (SEMAKAN 2017)
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DUAL LANGUAGE PROGRAMME

SCIENCE

YEAR 6

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- Educational Resources and Technology Division, Ministry of Education Malaysia.
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CONTENTS

INTRODUCTION

The *Science Year 6 Textbook* is written and interpreted based on the Standard Curriculum and Assessment Document (DSKP) Science Year 6 of the Science Standard-Based Curriculum for Primary School (Revised 2017). The publication of this book is aimed to fulfil the new policy under the Malaysia Education Blueprint (PPPM) 2013–2025 that integrates knowledge, values, 21st Century Learning Skills, and Higher Order Thinking Skills (HOTS) through Science, Technology, Engineering, and Mathematics (STEM) approach explicitly. The aim of this curriculum is to provide education that is comparable to international standards. Thus, this book is expected to contribute towards pupils' excellence.

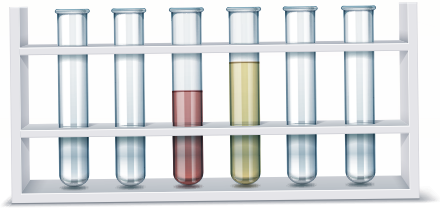
This textbook consists of 13 units that cover six themes: Inquiry in Science, Life Science, Physical Science, Material Science, Earth and Universe, as well as Technology and Sustainability of Life. The content of this textbook is designed to stimulate and capture pupils' interest in learning either in the classroom or independently. Each unit in this textbook begins with a stimulus page, followed by concluding activities, evaluation, and enrichment activities. To facilitate teaching and learning, answers are provided at the end of the book. Science Info contains additional information as added value to the contents of the topics discussed.

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

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

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

Suwaibatullaslamiah binti Jalaludin
Mohd Ramadhan bin Anwar
Jong Tze Kian



ICON DESCRIPTIONS

FUN ACTIVITY

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

LET'S TEST

Science activities based on simple investigation that help pupils to master the learning standards.

EXPERIMENT

Experimental activities based on the requirement of the learning standards.

FUN SCIENCE

Interesting and challenging enrichment activities to elicit pupils' creativity and encourage fun learning to appreciate the content of each unit.

MIND REFLECTION

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

MIND TEST

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

SCIENCE INFO

Additional information to increase pupils' knowledge.

21st Century Learning Skills

21st Century Learning and its elements in the suggested activities.

HIGHER ORDER THINKING SKILLS (HOTS)

Questions that can test pupils' thinking skills on the content learned.

TEACHER'S NOTES

Additional information to guide and assist teachers during the teaching and learning activities.

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

8.2.6, 8.2.7

Numbers referring to the learning standards as stipulated in the Standard Curriculum and Assessment Document (DSKP).

QR CODE

Additional information of learning activities that can be scanned and accessed using smartphones or tablets.

AR SAINS SK DLP TAHUN 6

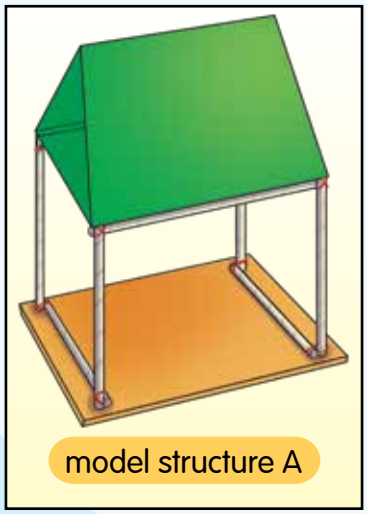
Additional information in the form of animation and interactive content that can be scanned using smartphones or tablets. Pupils need to download the *AR DBP Sains Tahun 6 SK* app either from Play Store (Android) or App Store (iOS 11 and above) before scanning the AR codes.

KPM

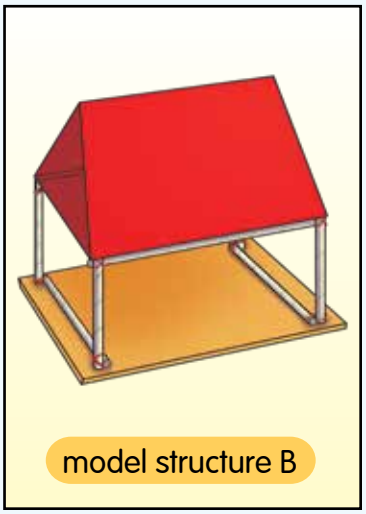
UNIT 1

SCIENTIFIC SKILLS

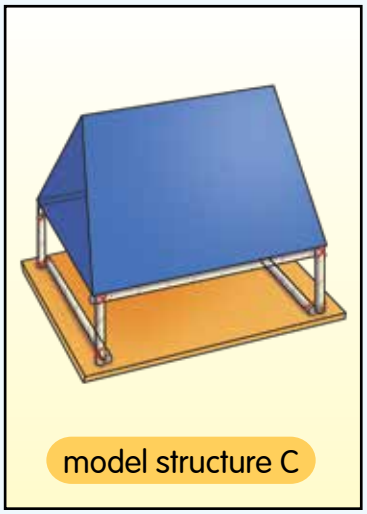
Alia wants to make a hurricane-proof building model. She applies scientific skills to make the most stable model.



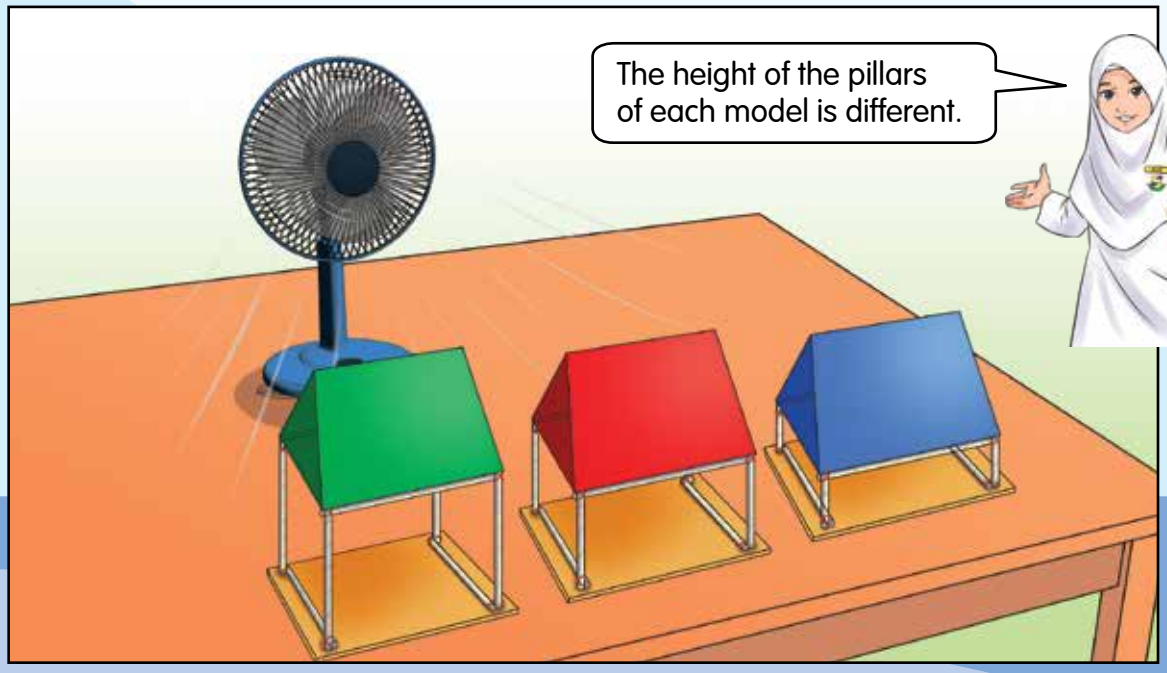
model structure A



model structure B



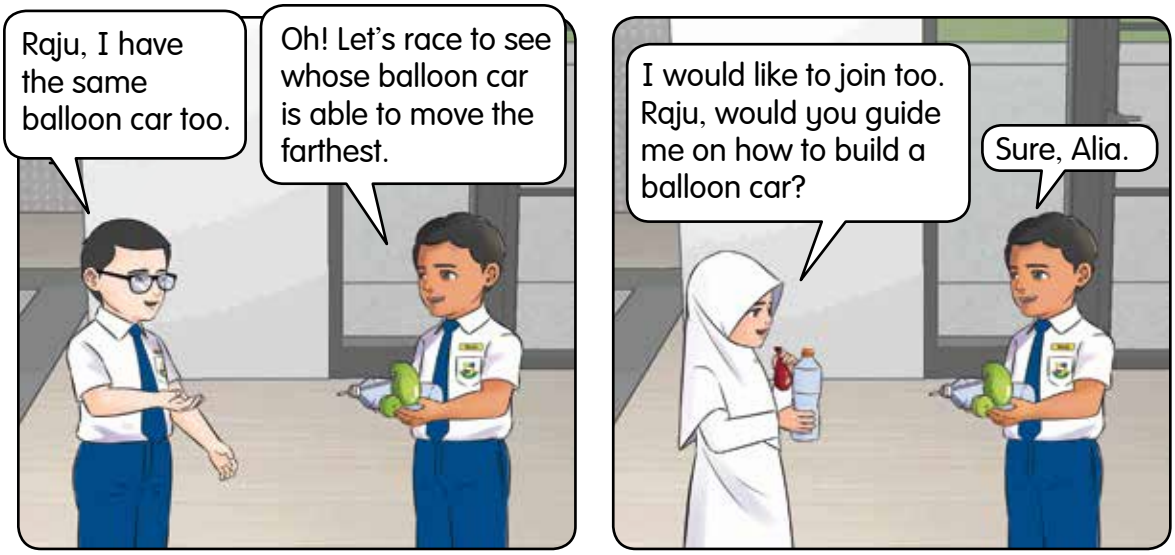
model structure C



Observe the models above. Predict which model will not fall easily when it is blown by wind. What is your reason?

Science Process Skills

Did you know that science process skills can help us to solve problems systematically? Do you still remember the science process skills that you have learned? Let us find out how Raju and his friends applied the science process skills that they have learned.



The apparatus and materials needed are scissors, adhesive tape, a ruler, a plastic bottle, four plastic bottle caps, a flexible drinking straw, two non-flexible drinking straws, two skewer sticks, and a balloon.

The steps to build a balloon car are as follows:

Be careful when using scissors.

1. 

Measure and cut two non-flexible drinking straws at the length of 11 cm.

2. 

Paste the drinking straws to the plastic bottle using adhesive tape.

3. 

Measure and cut two skewer sticks at the length of 15 cm.

1.1.1, 1.1.2, 1.1.3, 1.1.4, 1.1.5, 1.1.6, 1.1.7, 1.1.8, 1.1.9, 1.1.10, 1.1.11, 1.1.12

4.

Make a hole at the centre of each cap. Insert the skewer stick as shown.

5.

Insert the skewer sticks into both of the non-flexible drinking straws. They act as axles.

6.

Insert the flexible drinking straw into the balloon. Join them together using adhesive tape.

7.

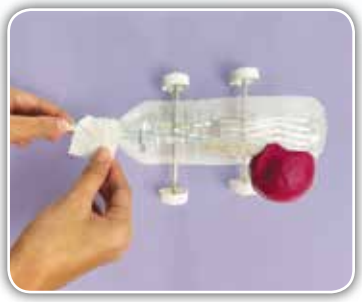
Make a hole on the upper part of the plastic bottle.

Be careful when using scissors.

8.

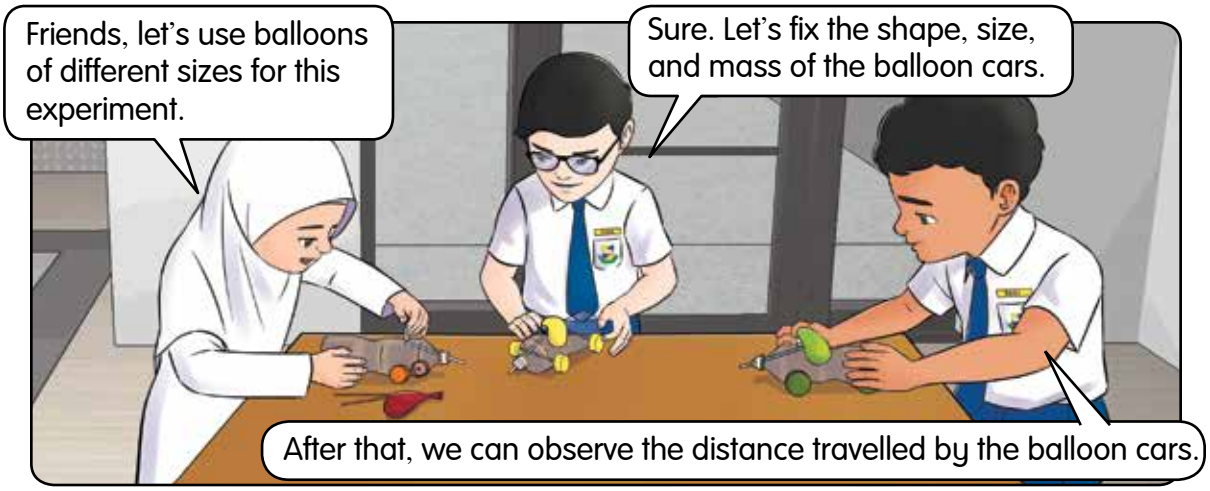
Insert the flexible drinking straw into the hole. Ensure that one end of the drinking straw is placed out of the bottle.

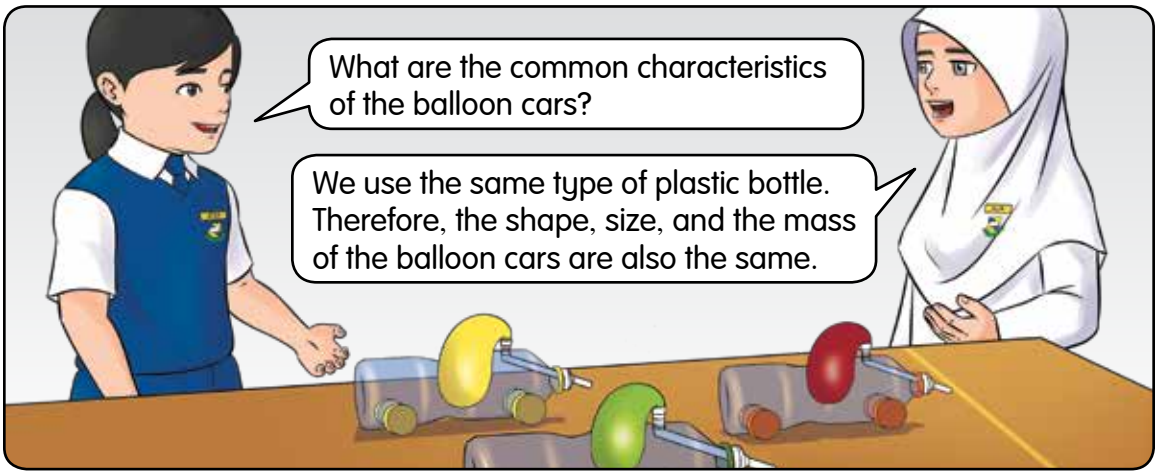
9.

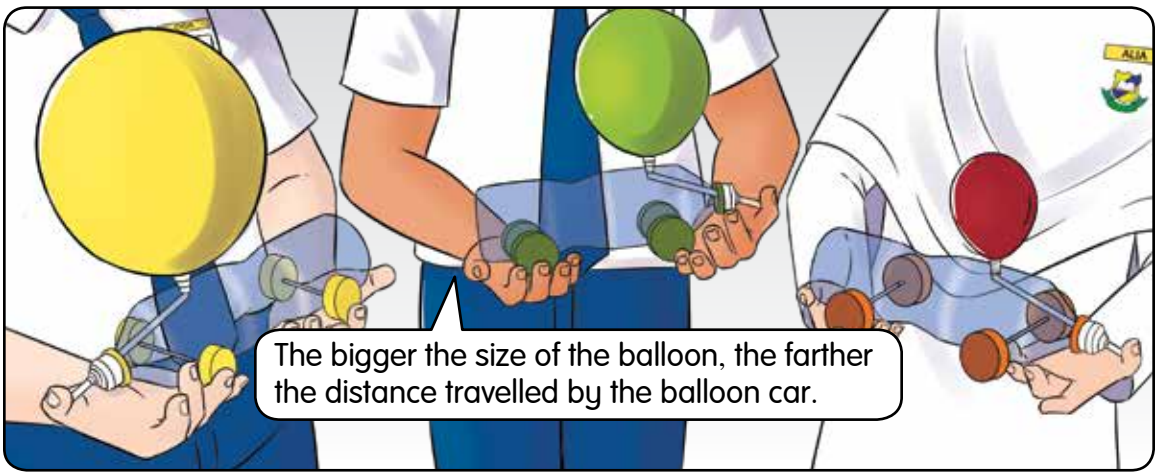


Stick the end of the drinking straw that is placed out of the plastic bottle using the adhesive tape.

Before testing the balloon car, Raju and his friends discuss the factors that affect the distance travelled by the balloon car.



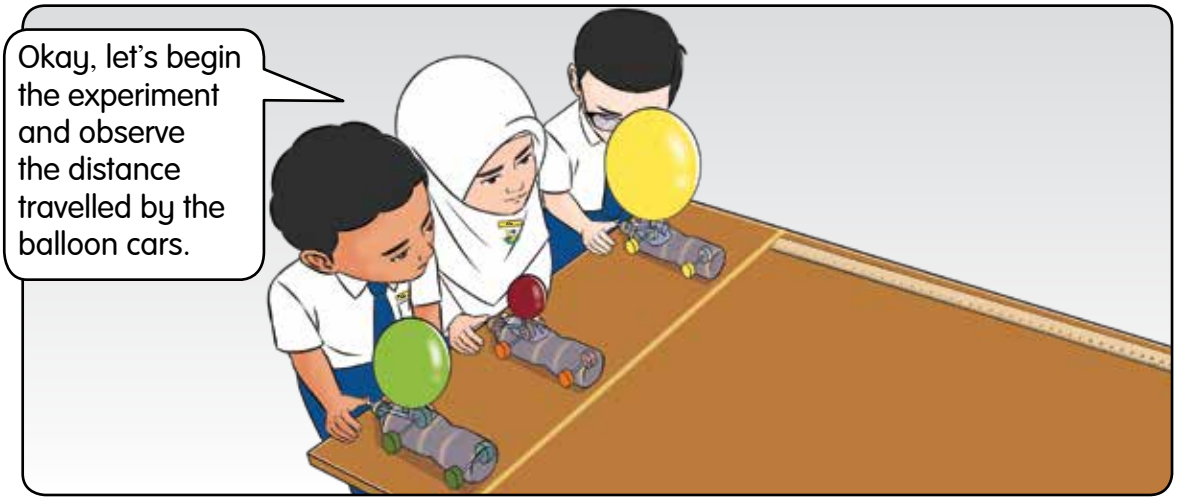


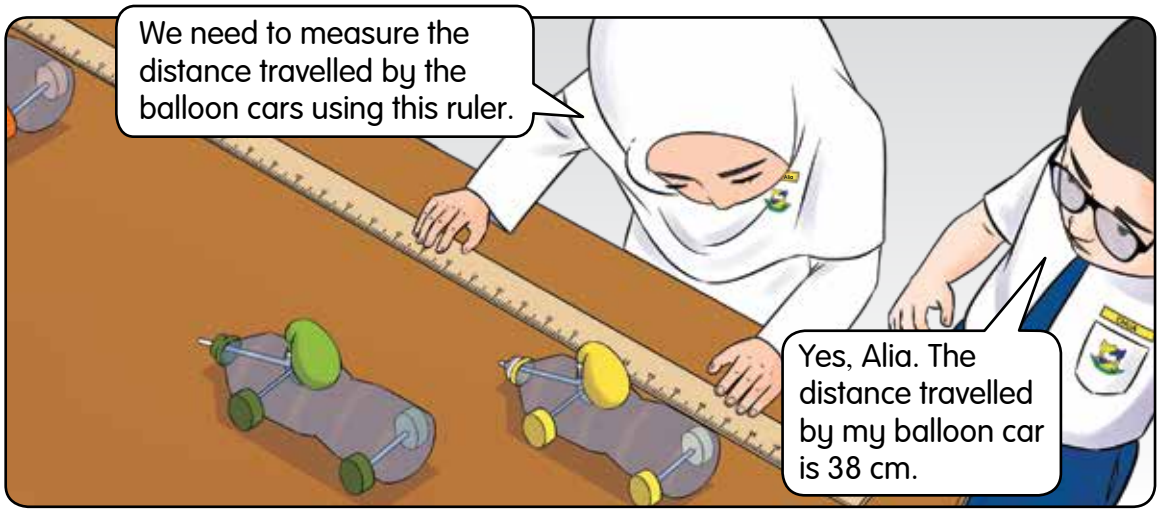


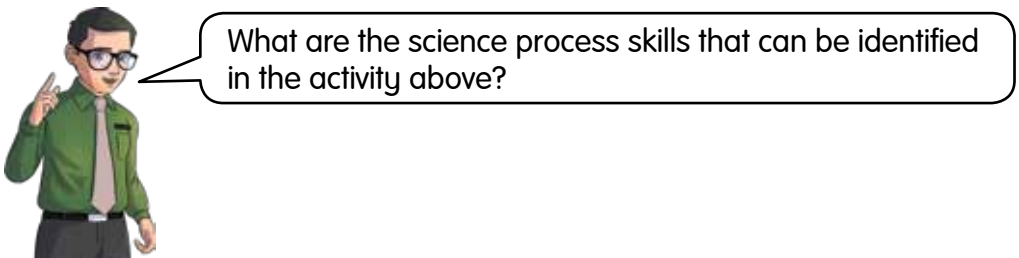
State the science process skills that are discussed by the pupils in each situation.

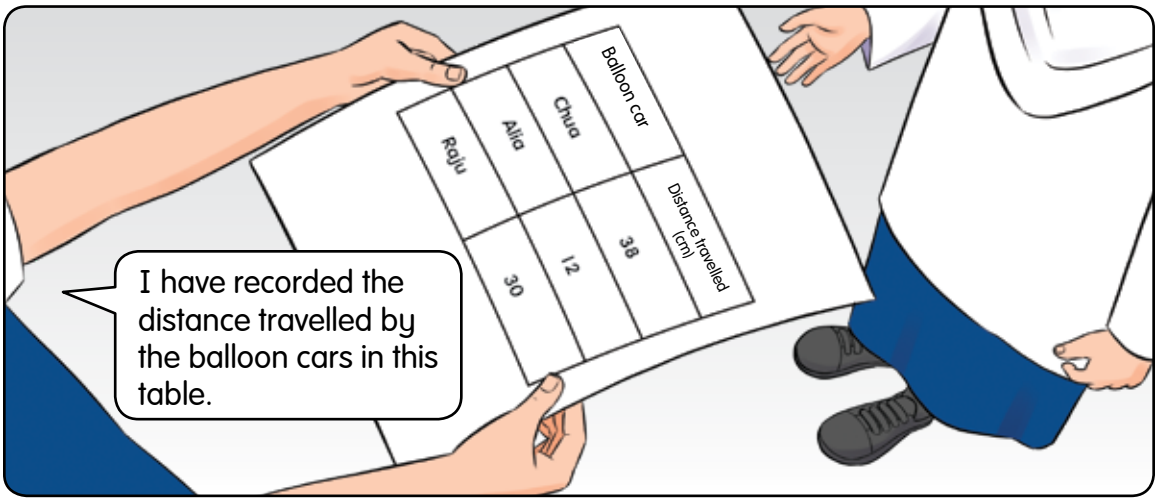
Assist the pupils to identify the variables in all of the steps of the experiment.

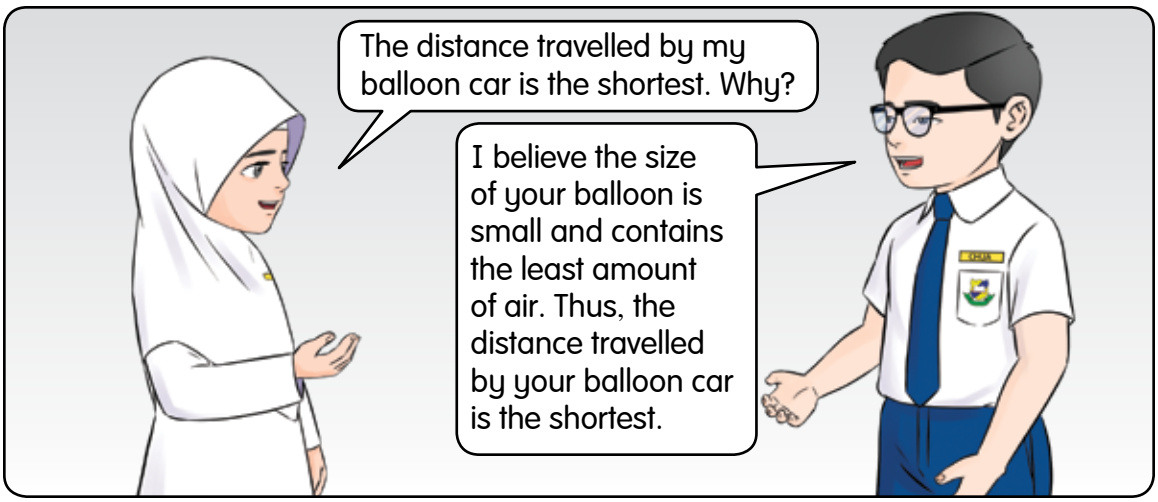

I predict that Chua's balloon car will travel the farthest.

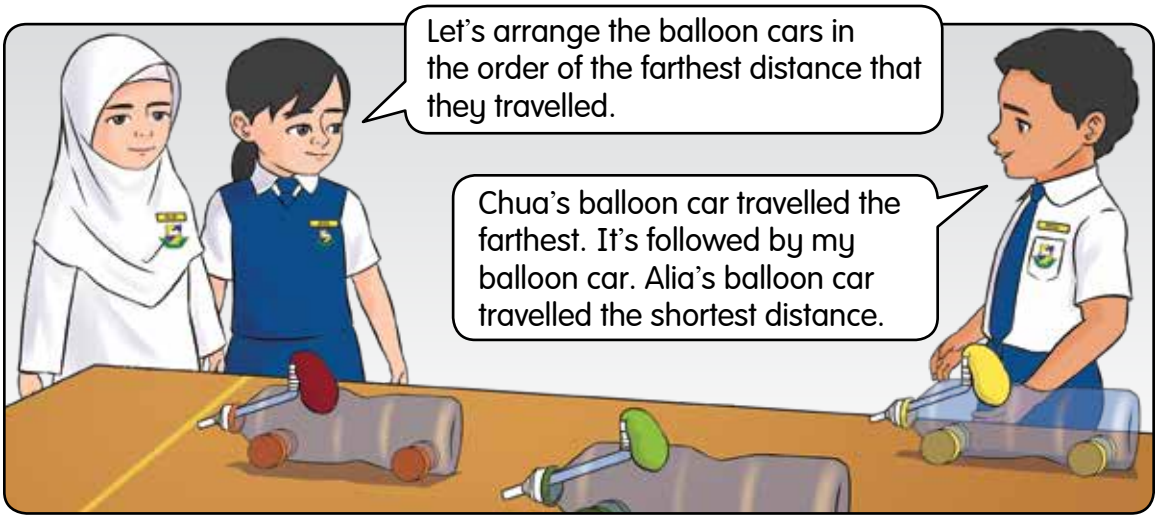

Okay, let's begin the experiment and observe the distance travelled by the balloon cars.

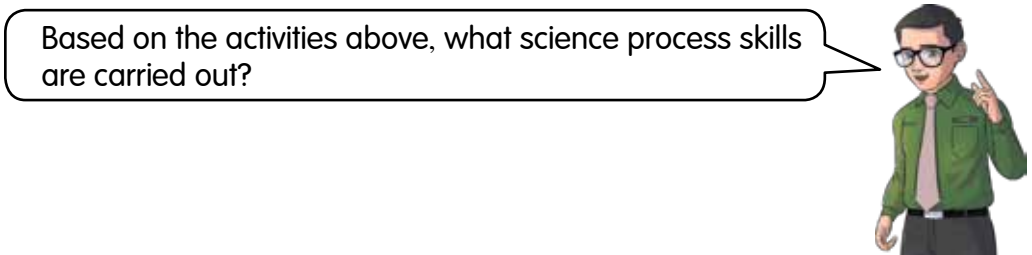

We need to measure the distance travelled by the balloon cars using this ruler.
Yes, Alia. The distance travelled by my balloon car is 38 cm.

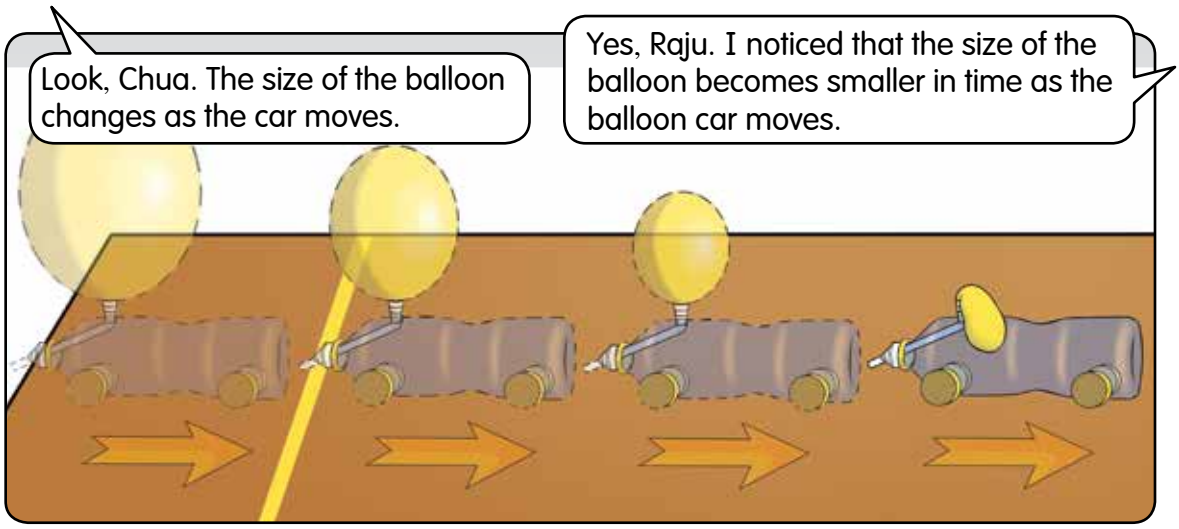

What are the science process skills that can be identified in the activity above?


I have recorded the distance travelled by the balloon cars in this table.
Balloon car
Distance travelled (cm)
Chua
38
Alia
12
Raju
30

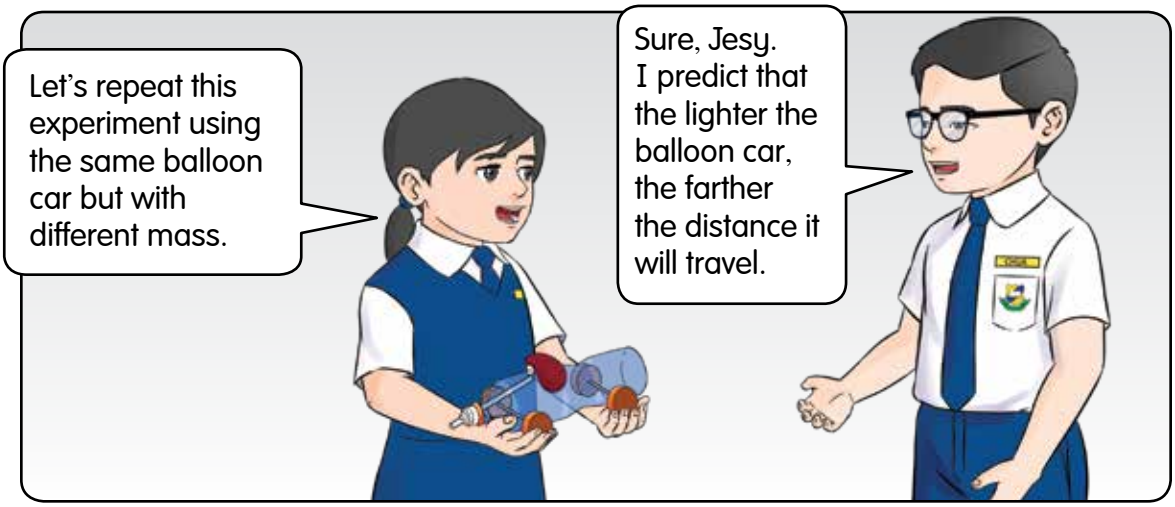

The distance travelled by my balloon car is the shortest. Why?
I believe the size of your balloon is small and contains the least amount of air. Thus, the distance travelled by your balloon car is the shortest.

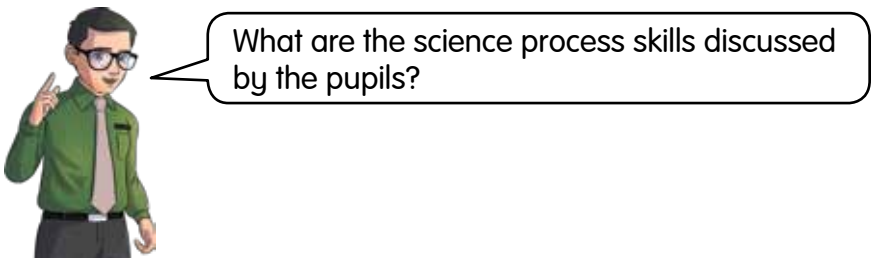

Let's arrange the balloon cars in the order of the farthest distance that they travelled.
Chua's balloon car travelled the farthest. It's followed by my balloon car. Alia's balloon car travelled the shortest distance.


Based on the activities above, what science process skills are carried out?


Look, Chua. The size of the balloon changes as the car moves.
Yes, Raju. I noticed that the size of the balloon becomes smaller in time as the balloon car moves.


Balloon car
Distance travelled (cm)
Chua
38
Alia
12
How do we determine the fastest balloon car?
In my opinion, the fastest balloon car is also the one that travelled the farthest. Hence, the balloon car that wins is the fastest.


Let's repeat this experiment using the same balloon car but with different mass.
Sure, Jesy. I predict that the lighter the balloon car, the farther the distance it will travel.


What are the science process skills discussed by the pupils?

EXPERIMENT

Mass Affects the Distance Travelled by the Balloon Car

Does the mass of the balloon car affect the distance travelled by the balloon car?

Group Activity

Be careful when using scissors.

Plan and conduct an experiment to test your hypothesis. Write a report of the experiment based on the format shown below.

1. **Aim:** _____
2. **Problem statement:** _____
3. **Hypothesis:** _____
4. **Variables:**
   (a) manipulated: _____
   (b) responding: _____
   (c) constant: _____
5. **Apparatus and materials:**
   scissors, adhesive tape, ruler, one plastic bottle, four plastic bottle caps, one flexible drinking straw, two non-flexible drinking straws, two skewer sticks, one balloon, 12 pieces of 10 sen coin
6. **Steps:** _____
7. **Data:** _____
8. **Interpreting Data:** _____
9. **Conclusion:**
   (a) The hypothesis is (accepted/not accepted).
   (b) State the conclusion: _____

1.1.1, 1.1.2, 1.1.3, 1.1.4, 1.1.5, 1.1.6, 1.1.7, 1.1.8, 1.1.9, 1.1.10, 1.1.11, 1.1.12

KPM

FUN ACTIVITY

Magic Water

Pairwork Activity

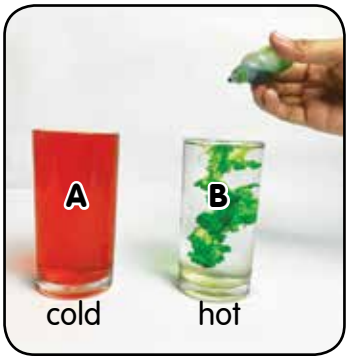
Apparatus and materials: two clear glasses of the same size, a piece of hard plastic sheet, an oven glove, cold water, hot water, two different food colourings

Be careful when handling hot water.

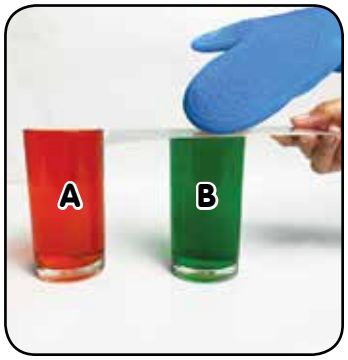
Steps:

1. 

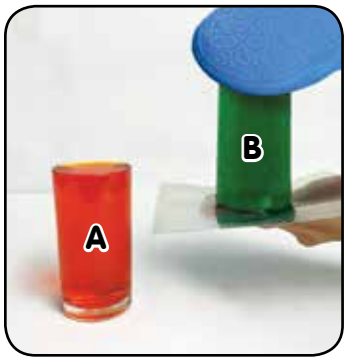
Label the glasses as A and B. Pour cold water into glass A and hot water into glass B.

2. 

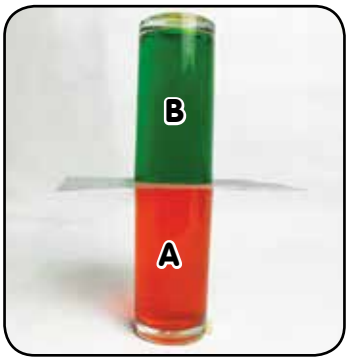
Add a few drops of red colouring into glass A and green colouring into glass B. Then, stir each solution well.

3. 

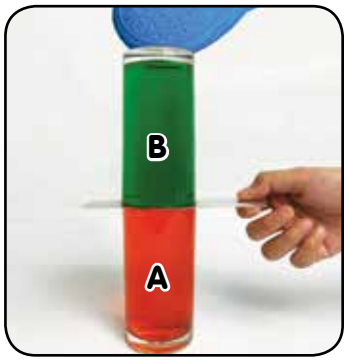
Place a piece of hard plastic sheet on top of glass B and press it using an oven glove.

4. 

Invert glass B and place it on top of glass A.

5. 

Ensure that the positions of glasses A and B are as shown in the picture.

6. 

Pull the hard plastic sheet slowly and observe.

Questions:

1. What is your observation for the activity carried out? Explain.
2. What science process skills are involved in this activity?

1.1.1, 1.1.3, 1.1.5, 1.1.6, 1.1.9, 1.1.10, 1.1.11, 1.1.12

FUN SCIENCE

Bottle Mill

Make a bottle mill using a pair of scissors, coloured adhesive tape, and plastic bottle.

Steps:

Be careful when using scissors.

1. 

Measure 10 cm from the bottom of the bottle and cut it out.

2. 

Measure 8 cm and cut vertically along the whole bottle into strips.

3. 

Fold each strip that has been cut outwards to form the fan blade.

4. 

Decorate the fan blades using coloured adhesive tape.

5. 

Place the fan blades upside-down on top of the bottle.

6. 

Hold the bottle mill below a rotating ceiling fan.

bottle mill

MIND REFLECTION

The science process skills are as follows:

- observing
- classifying
- measuring and using numbers
- making inferences
- predicting
- communicating
- using space-time relationship
- interpreting data
- defining operationally
- controlling variables
- making hypothesis
- experimenting

MIND TEST

Answer all questions in the Science exercise book.

1. The pictures below show the methods to harvest paddy.

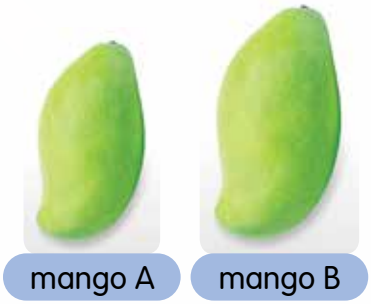
using a sickle

using a machine

Method to harvest paddy	Land area (hectare)
using a sickle	1.5
using a machine	5

What are the variables identified?

2. The pictures show two mangoes of the same type. They were plucked from different orchards. The table below is the data recorded by a Year 6 pupil.



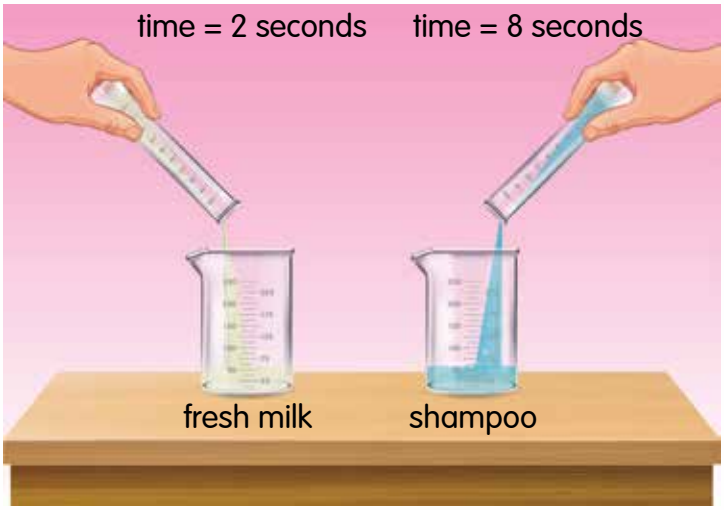
mango A mango B

Characteristic \ Fruit	Mango A	Mango B
mass (g)	400	600
taste	sour	sweet

(a) Give an observation and state an inference about the differences between mangoes A and B.

(b) State one more observation to support the inference in 2(a).

3. Laili poured 100 mℓ of fresh milk and 100 mℓ of shampoo into two different beakers. She recorded the time taken for each liquid to flow out completely from the measuring cylinder. State one hypothesis that can be made from this activity.



4. The picture below shows several types of animals that are reared by Pak Teh.

(a) What is the common characteristic that can be used to classify these animals?
(b) Suggest other common characteristics that can be used to classify these animals.
(c) Make a classification chart for the common characteristics that you have suggested.

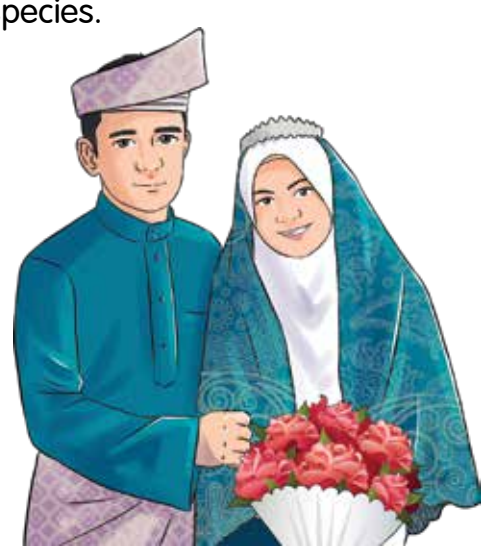
UNIT 2 HUMANS

Observe the situation in the picture. The birth of a child is a happy and miraculous event for a married couple.

Do you know how a baby is formed? What would happen if there were no babies in this world?

Human Reproduction

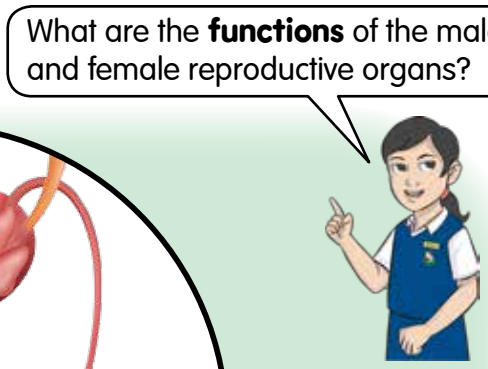
A newborn baby is formed through human reproduction. Humans reproduce to ensure the survival of their species.

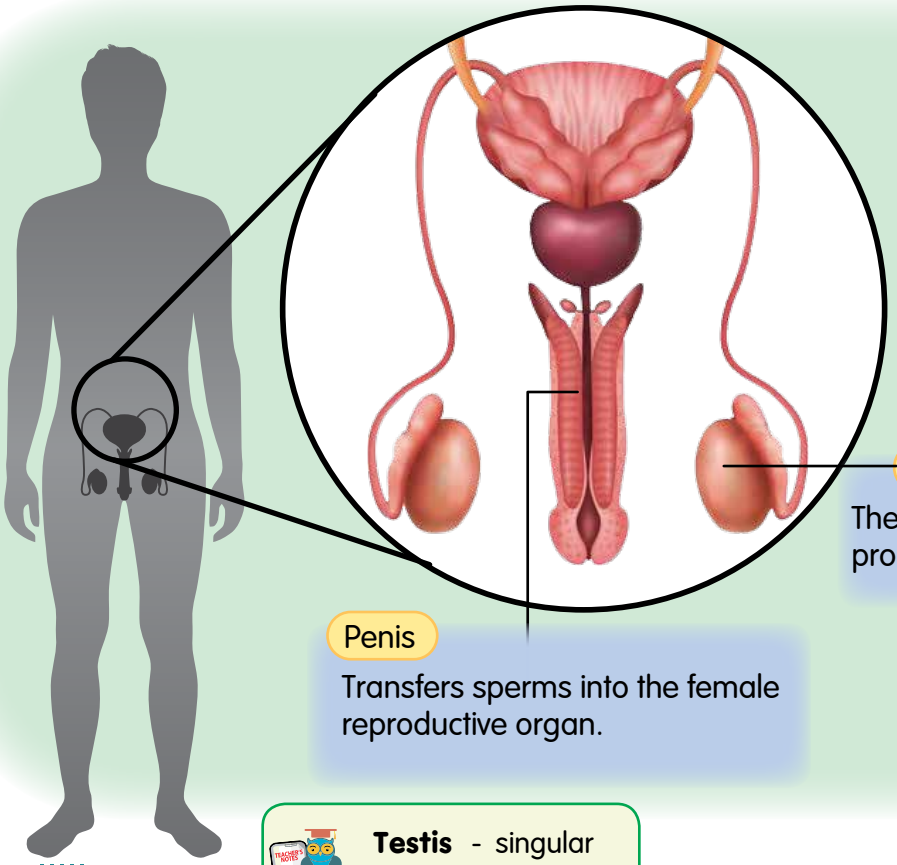


Humans reproduce through a process called reproduction. Reproduction involves a man and a woman. The male and female reproductive organs make up the reproductive system.

Male Reproductive Organs

The male reproductive organs consist of the testes and penis.





Testis

The organ that produces sperms.

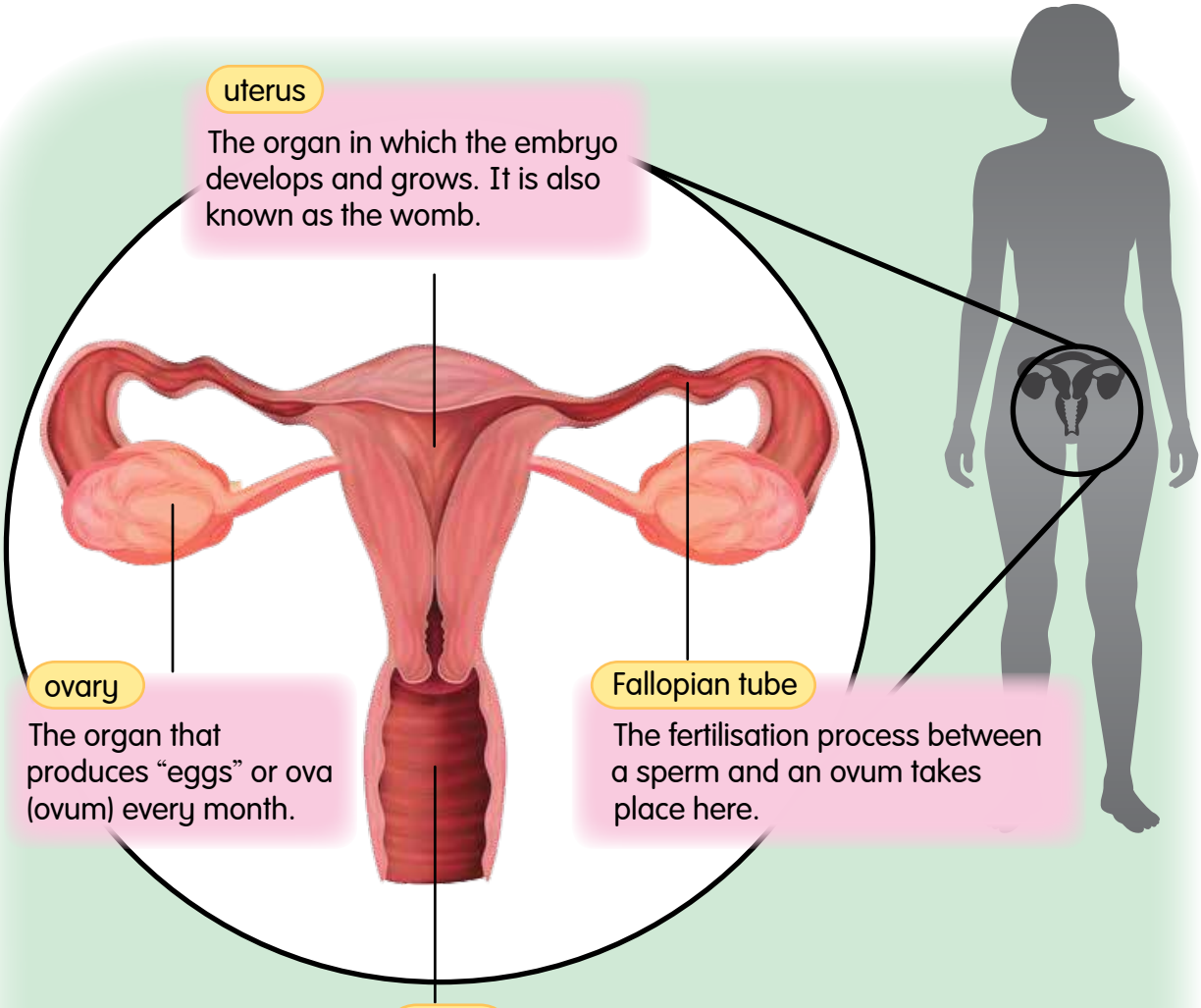
Penis

Transfers sperms into the female reproductive organ.

Testis - singular
Testes - plural

Female Reproductive Organs

The female reproductive organs consist of the vagina, uterus, Fallopian tubes, and ovaries.



uterus

The organ in which the embryo develops and grows. It is also known as the womb.

ovary

The organ that produces "eggs" or ova (ovum) every month.

Fallopian tube

The fertilisation process between a sperm and an ovum takes place here.

vagina

A vagina is a channel that receives sperms from the penis.

Describe the **functions** of the male and female reproductive organs.

If the ovary releases more than one ovum at once and these ova are successfully fertilised, there is a probability that multiple births will take place.

Ovum - singular
Ova - plural

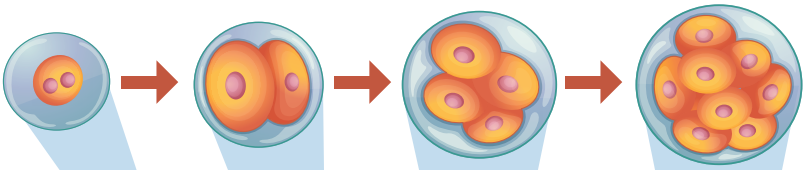
The Process of Human Fertilisation Until Birth

Do you know what fertilisation process is? A fertilisation process is the fusion of a sperm from a male parent and an ovum from a female parent.

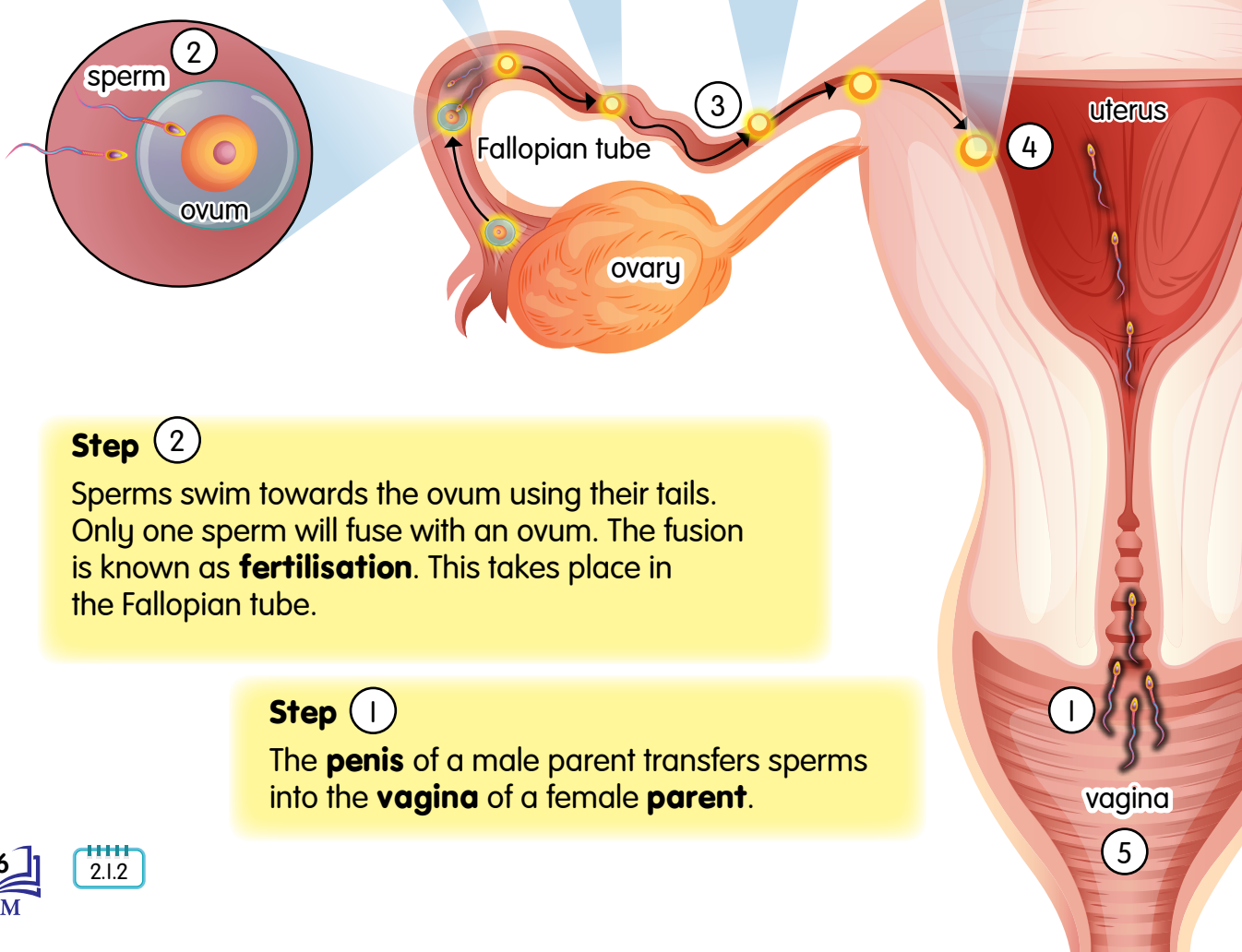
Let's look and understand the process of human fertilisation until the baby is born.

Step (3)

The **ovum** that has been fertilised by a sperm is known as a **zygote**. The zygote divides itself and forms multiple cells known as the **embryo**.



zygote divides itself forming an embryo



Step (2)

Sperms swim towards the ovum using their tails. Only one sperm will fuse with an ovum. The fusion is known as **fertilisation**. This takes place in the Fallopian tube.

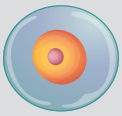
Step (1)

The **penis** of a male parent transfers sperms into the **vagina** of a female **parent**.

SCIENCE INFO

Sperm

When a boy reaches puberty, his testes start producing sperms.

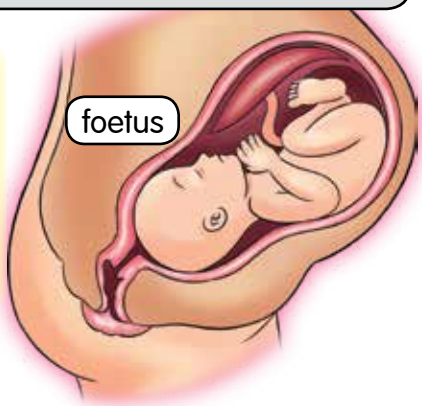


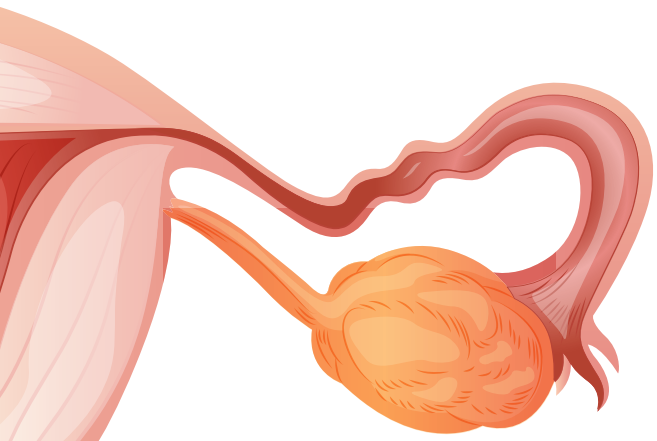
Ovum

When a girl reaches puberty, her ovaries produce ova.

Step 4

An **embryo** develops in the uterus of the mother to form a **foetus**. The **foetus** remains in the uterus of the mother for about nine months until its organs are completely developed.





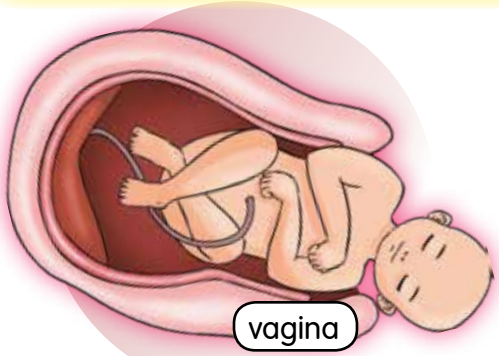
AR SAINS SK DLP TAHUN 6

SCIENCE INFO

A developing foetus is connected to the mother through the umbilical cord. It provides nutrients and oxygen from the mother to the foetus. The umbilical cord also removes waste products from the foetus.

Step 5

After about nine months, the mother gives birth to the **foetus** through the vagina. The foetus is now known as a **baby.**

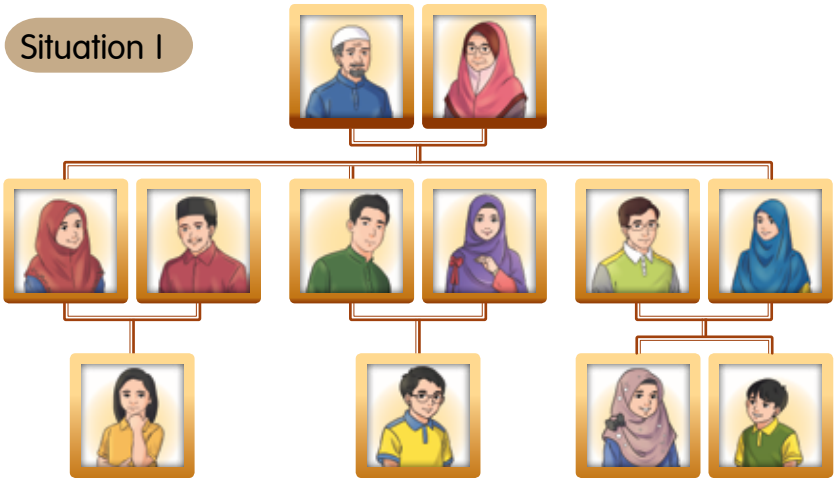


Based on the situation above, explain the process of human fertilisation until birth.

The Importance of Reproduction to Humans

Reproduction is very important to humans just like any other life processes. Observe the situation below.

Situation 1

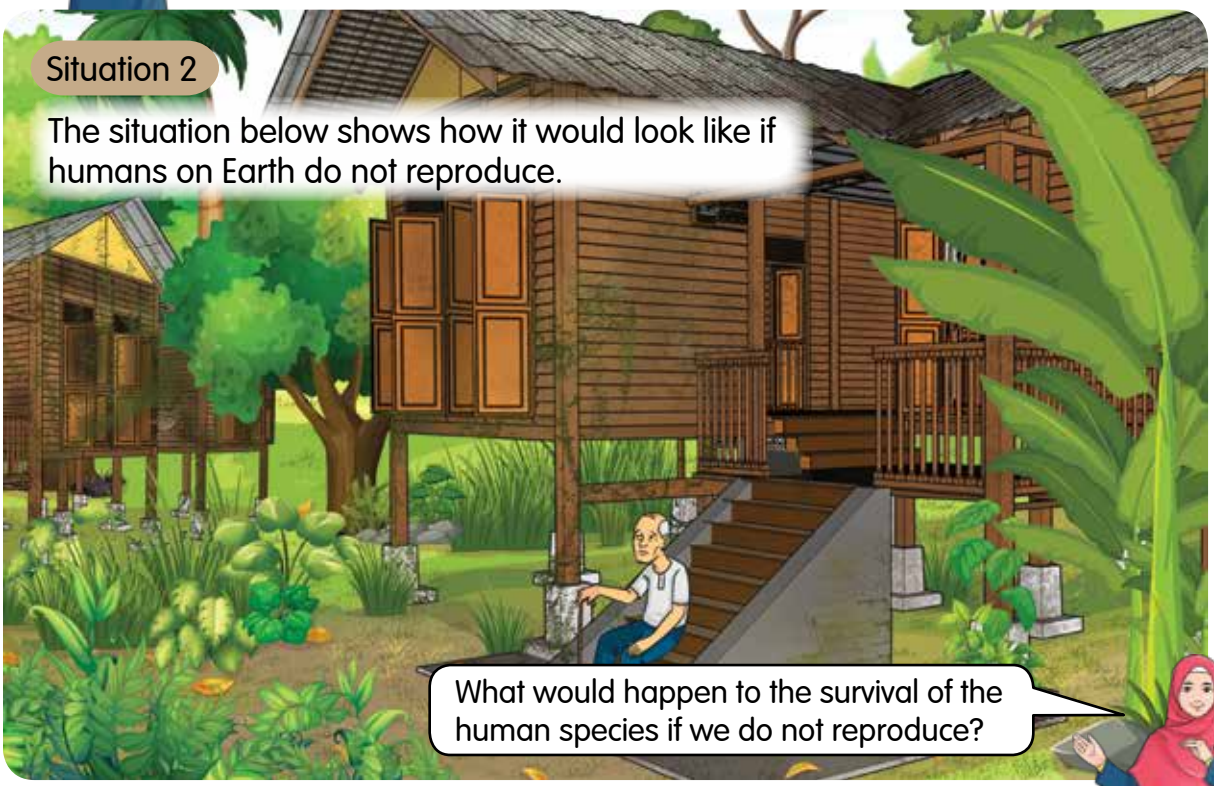


Encik Ahmad has three children from his marriage to his wife. Now, his family consists of 12 persons.

Reproduction is important to increase the number of new individuals. What would happen to the number of Encik Ahmad's family members if he and his wife did not reproduce?

Situation 2

The situation below shows how it would look like if humans on Earth do not reproduce.



What would happen to the survival of the human species if we do not reproduce?

FUN ACTIVITY

Human Reproduction Poster

Apparatus and materials:
computer, Internet access, printer, scissors, manila card, adhesive tape, coloured markers

reproductive organs and the process of human fertilisation

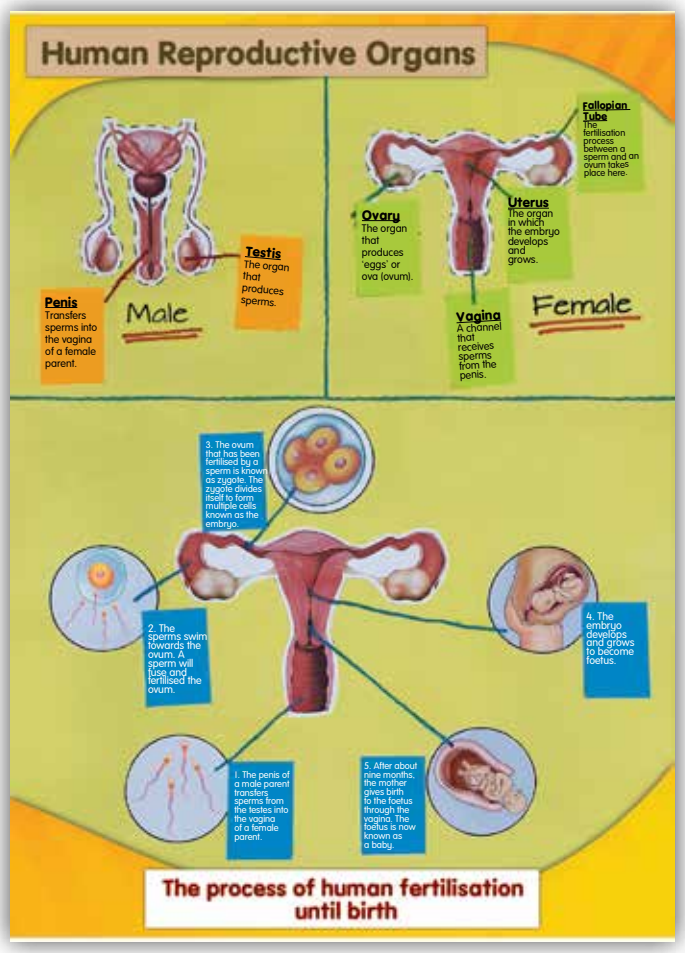
Group Activity

21st Century Learning Skills

Be careful when using scissors.

Steps:

1. Scan the QR code to download the diagrams of human reproductive organs and the process of human fertilisation.
2. Print and paste the diagrams on a manila card.
3. In groups, discuss and label the male and female reproductive organs as well as their functions.
4. Discuss the process of human fertilisation until the baby is born in the correct sequence. Write about the process on the manila card.
5. Display the work of your group. The leader of the group will explain the process of human fertilisation.

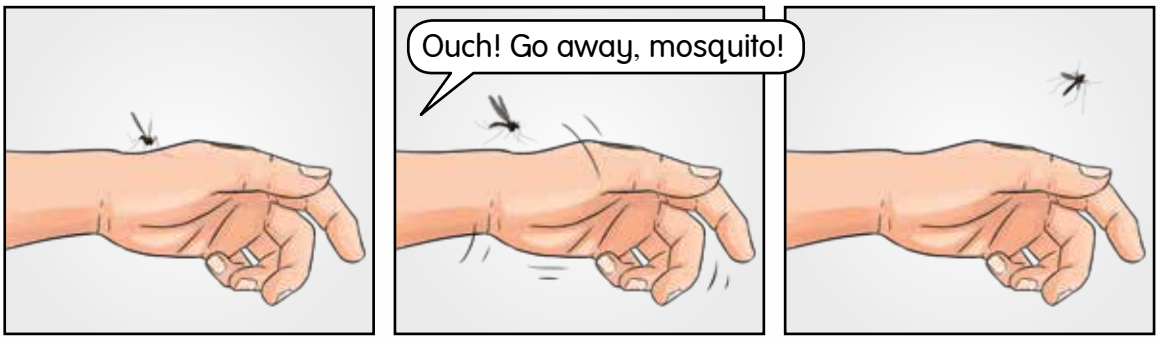


Questions:
1. Explain the functions of the male and female reproductive organs.
2. Explain the process of human fertilisation.
3. What is the importance of reproduction to humans?

2.1.1, 2.1.2, 2.1.3, 2.1.4, 2.2.6

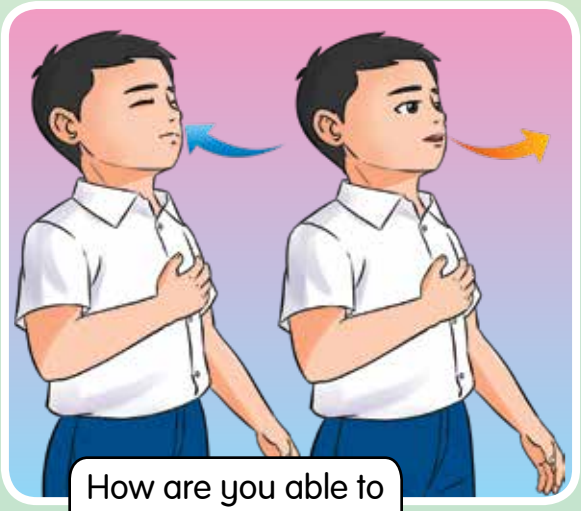
The pupils may also present the above activity in the form of an electronic poster (e-poster).

Human Nervous System



What happens when your hand is bitten by a mosquito?
You will shake it off quickly.

What happens when you bite a sour orange? You will taste the sourness of the orange immediately.



How are you able to breathe naturally?

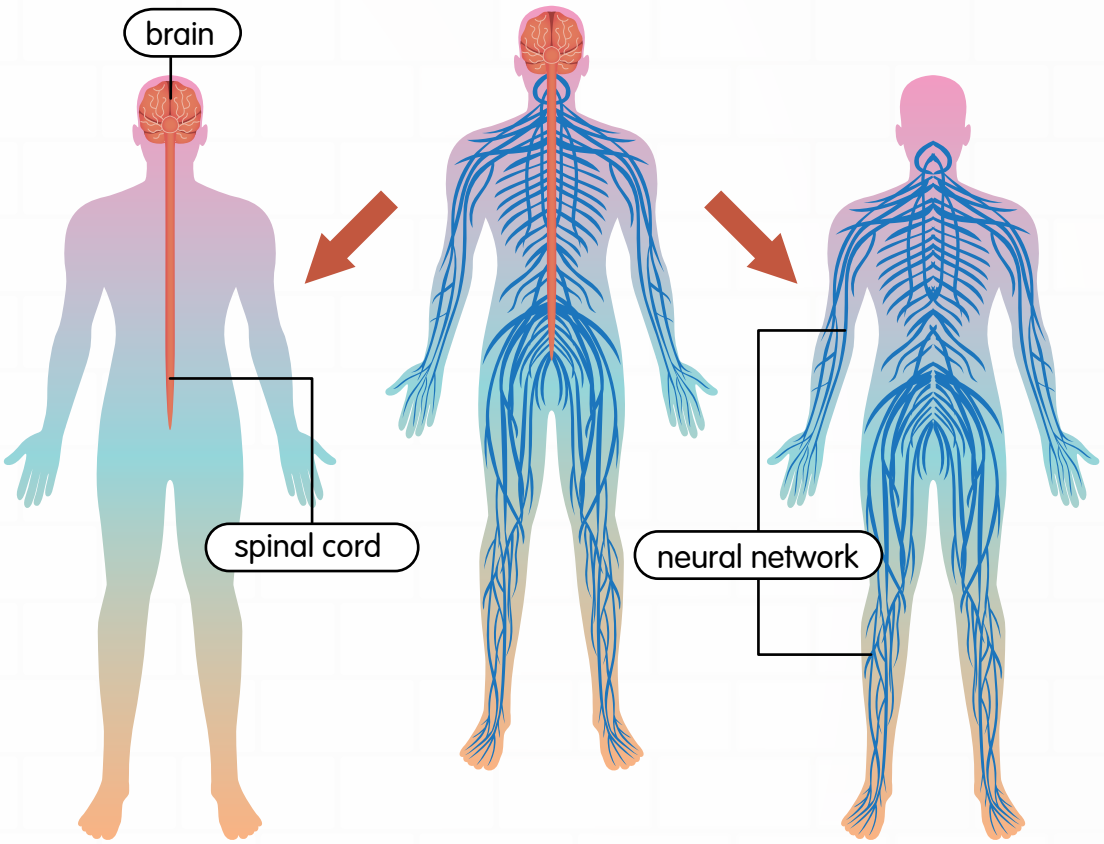
All actions produced by the body are caused by the coordination of a system. This system controls the functions of the human body. This system tells the body how to respond when in contact with a stimulus. Do you know what the system is called?

Body coordination is the regulation of bodily response towards any stimulus around us.

Types of Human Nervous System

The nervous system consists of the brain, the spinal cord, and a network of nerves throughout the body.

There are two types of the human nervous system. They are the **central nervous system** and the **peripheral nervous system**.



Central nervous system

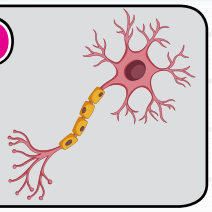
The central nervous system consists of the **brain** and the **spinal cord**.

Peripheral nervous system

The peripheral nervous system consists of a **neural network**. It is controlled by the central nervous system.

SCIENCE INFO

The basic unit of the nervous system is known as a nerve cell or neuron.



State the types of human nervous system and the components that are involved.

Functions of the Human Nervous System

The nervous system controls and coordinates different functions of the organs and parts of the body. This system **detects** and **responds to stimulus**. The nervous system communicates with different parts of the body through **signal transmission**.

Functions of the Central Nervous System

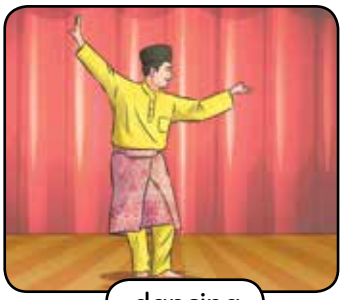
The central nervous system acts as a **centre to receive information from the sensory organs** and **to coordinate responses**. Let us get to know the central nervous system.

brain

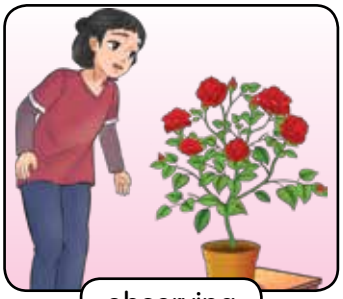
The brain **coordinates both voluntary** and **involuntary actions**.

Voluntary Actions

Examples of voluntary actions are as follows:



dancing



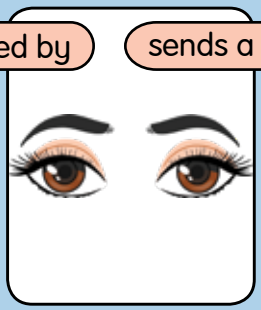
observing

eating

What happens when you look at a flower? Understand the pictures below that show the signal pathway that is controlled by the central nervous system.

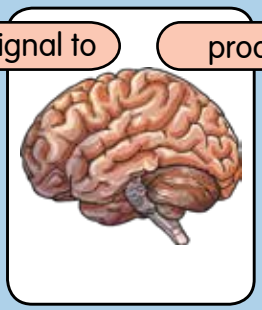
stimulus

detected by



sensory organ

sends a signal to



brain

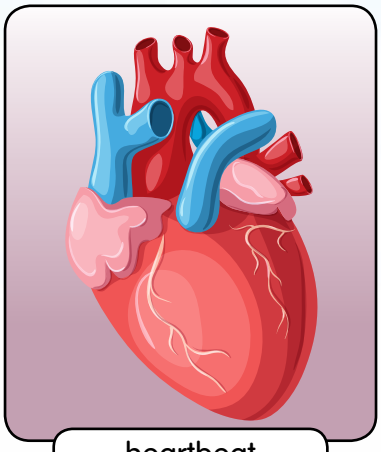
produces

response

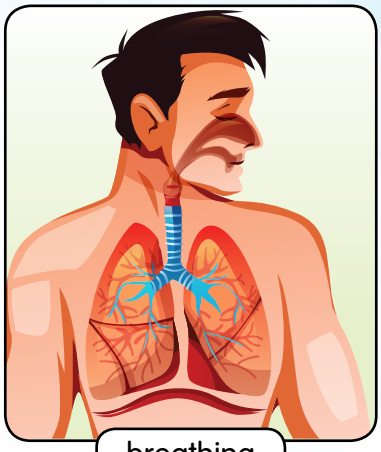
The order of the signal pathway from stimulus to **response**

Involuntary Actions

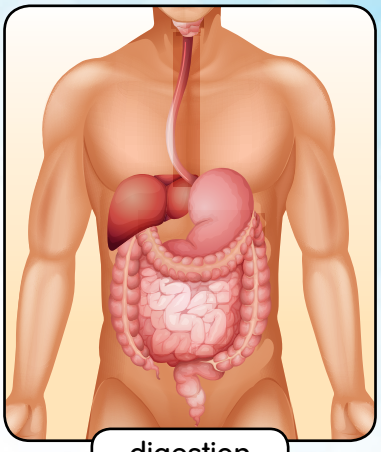
Examples of involuntary actions are as follows:



heartbeat



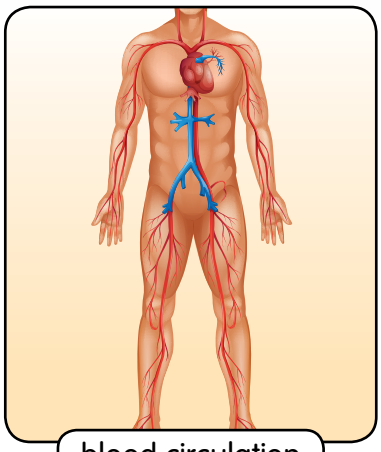
breathing



digestion

Based on your understanding, state the actions involved in each of the pictures below.

drinking

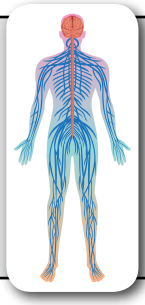


blood circulation

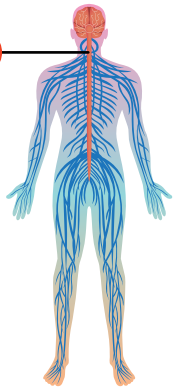
talking

SCIENCE INFO

A signal travels several hundred kilometres per hour. Thus, a signal takes less than one second to travel from head to toe.



- Voluntary action is an action that takes place with conscious control.
- Involuntary action is an action that takes place unconsciously.



The spinal cord is attached to the brain. It **carries information from the whole body to the brain** and **from the brain to the whole body**. The spinal cord **also controls some of the reflex actions**.

Reflex Actions

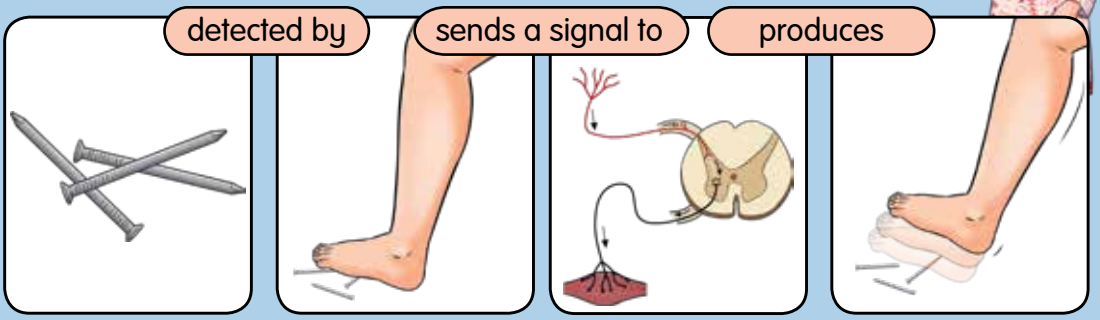
Reflex actions are quick unconscious actions. In certain situations, the spinal cord receives signals and commands the body to respond. Examples of situations involving reflex actions are as follows:

accidentally stepping on a sharp object

sneezing when dust enters the nostrils

accidentally touching a hot object

What happens when you accidentally step on a sharp object? Understand the pictures below that show the signal pathway that is controlled by the spinal cord.



The order of the signal pathway from stimulus to **response**

Describe the central nervous system and its functions.

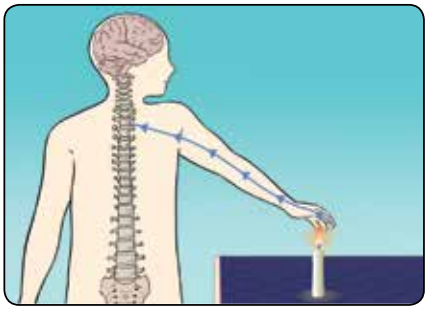
A reflex action is an immediate unconscious response.

Functions of the Peripheral Nervous System

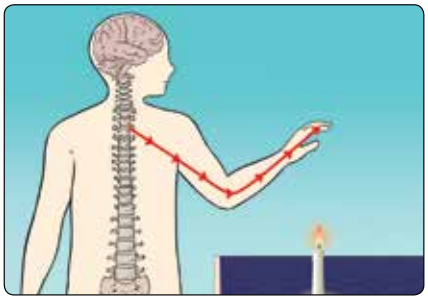
The peripheral nervous system consists of a network of nerves outside the brain and the spinal cord.

The peripheral nervous system **sends signals from the body to the central nervous system** and **sends command signals from the central nervous system to the whole body**.

Signal from the body is sent to the central nervous system.



Command signal from the central nervous system is sent to the rest of the body.



Dysfunctional Peripheral Nervous System

Damage to the peripheral nervous system may disturb the signal transmission between the brain and the spinal cord to the body parts.

Bell's palsy

Bell's palsy is a condition where the peripheral nerves that control the facial muscles are damaged. Control of the facial muscles is disrupted and causes one side of the face to droop. Patients will also have difficulty to smile or close their eyes.

Body imbalance problems

Damaged nerves in the legs may cause the body to lose balance and fall.

2.2.3, 2.2.4

Taking Care of the Nervous System

The nervous system plays an important role in all aspects of our health. It coordinates our daily activities such as waking up from sleep, breathing, thinking, and reading. Therefore, we need to take good care of this system so that all other related systems will function well too.

How do we take care of our nervous system?

Eat a balanced diet

A balanced diet containing vitamin B complex and minerals is important for our nerves.

Avoid drinking alcoholic beverages

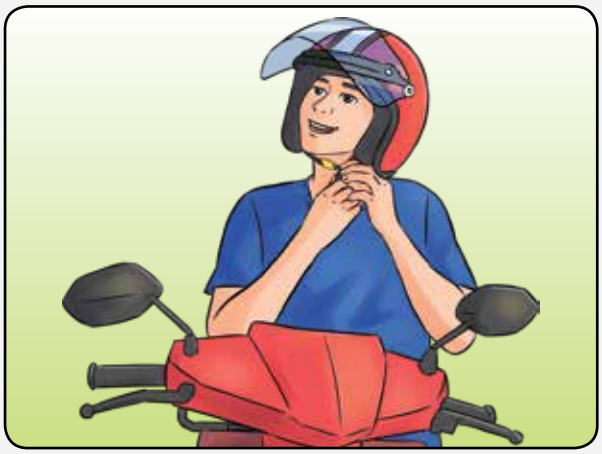
The habit of drinking alcoholic beverages may slow down the transmission of signals within the nervous system.

Get enough sleep

Sleeping between seven to eight hours a day can strengthen our neural network system. It can also strengthen our memory.

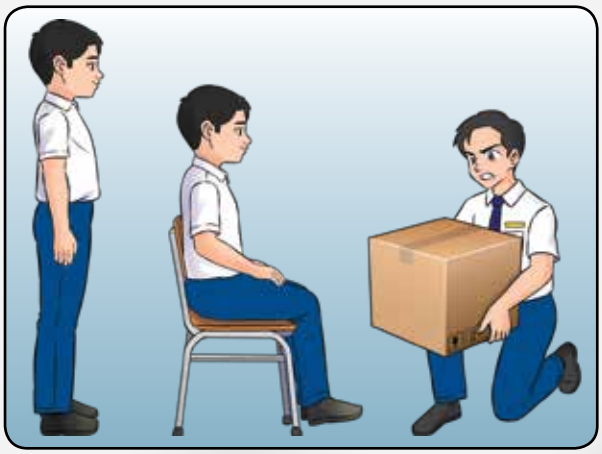
Wear protective gears

Wearing protective gears such as a helmet when riding a motorcycle can prevent brain damage in case of an accident.



Maintain good posture while doing daily activities

Maintaining good posture while standing, sitting, and doing our daily activities can avoid damage to our nervous system.



back body protector

Observe the back body protector used by the man. How does this protective gear protect the nervous system?

FUN ACTIVITY

The Nervous System Signalling Activity

Group Activity

21st Century Learning Skills

Apparatus and materials: flip chart paper, scissors, glue, strings, adhesive tape, marker pen, and pictures of the human brain, spinal cord, and organs

Be careful when using scissors.

1. 

Ask a friend to lie down on the flip chart paper. Draw the outline of your friend's body using a marker pen.

2. 

Cut and paste the pictures of the human brain and spinal cord. Then, cut and paste the strings to indicate the peripheral nerves.

3. 

Paste the pictures of organs accordingly.

4. 

Start the activity. The activity will show the signal pathway that would take place in a particular situation. For example, your group would choose a situation such as "smelling food being cooked". Each group member will call out the pathway that the signal will follow while showing the organs and nerves involved.

5. Choose a different situation to continue the activity.

Questions:

1. State the types of human nervous system.
2. Define the central nervous system and explain its functions.
3. Define the peripheral nervous system and explain its functions.

Ask the pupils to find the pictures needed using various sources before class.

FUN SCIENCE

Let's Play Bingo!

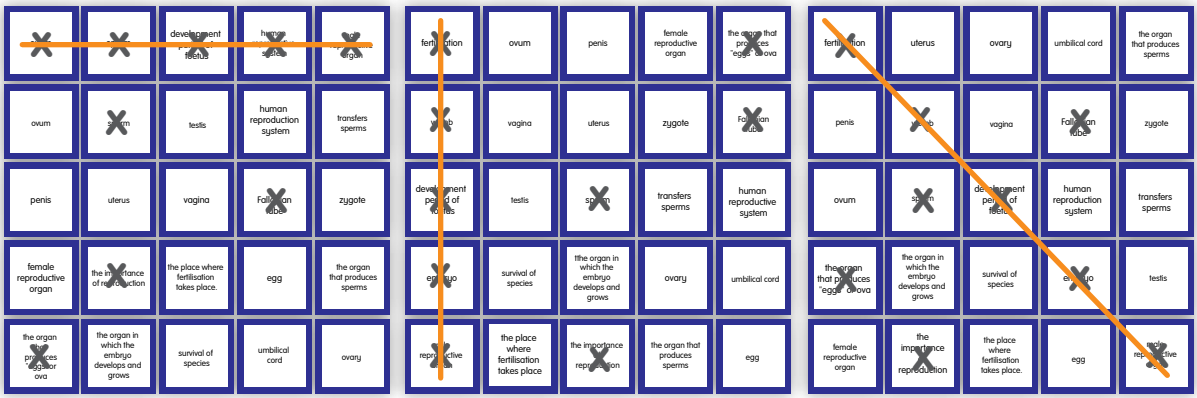
Let us play Bingo based on the process of human fertilisation. We need A4 paper, marker pens, and rulers. This game is suitable for two to five pupils.

Steps:

1. Each player gets an A4 paper. Then, divide the paper into 25 squares.
2. The teacher prepares 25 terms or clues related to the human reproduction.
3. All players write the terms and clues in the squares randomly.
4. A player will cross out a square with the term or clue and say out the meaning.
5. Other players will cross out the same term or clue on their own paper.
6. Repeat steps 4 and 5 for each player.
7. The player who successfully crosses out five squares in a line vertically, horizontally or diagonally and says "Bingo", becomes the first winner.
8. The game continues on to find the next winner.

ovum	sperm	testis	human reproductive system	transfers sperms
female reproductive organ	womb	the development period of foetus	embryo	male reproductive organ
penis	the organ in which the embryo develops and grows	vagina	Fallopian tube	zygote
fertilisation	the importance of reproduction	the place where fertilisation takes place.	egg	the organ that produces sperms
the organ that produces "eggs" or ova	ovary	survival of species	umbilical cord	uterus

figure 1



horizontal vertical diagonal

MIND REFLECTION

Human Reproduction System

1. The male reproductive system consists of the following organs:

Organ	Function
testis	the organ that produces sperms
penis	transfers sperms into the female reproductive organ

2. The female reproductive system consists of the following organs:

Organ	Function
vagina	a channel that receives sperms from the penis
uterus	the organ in which the embryo develops and grows
Fallopian tube	the fertilisation process between a sperm and an ovum takes place here
ovary	the organ that produces "eggs" or ova (ovum) every month.

3. The process of human fertilisation until the baby is born is as follows:
   (a) the penis releases sperms into the vagina
   (b) sperms move towards the ovum
   (c) a sperm fertilises the ovum and forms a zygote
   (d) the zygote divides to form an embryo
   (e) the embryo develops to form a foetus
   (f) the mother gives birth to the foetus which is now known as a baby
4. The importance of reproduction to humans is to increase the population and to avoid extinction.

Human Nervous System

1. The human nervous system consists of two systems:
   - The central nervous system consists of the brain and spinal cord.
   - The peripheral nervous system consists of a neural network.
2. The central nervous system functions as a centre to receive information from the sensory organs and to coordinate response.
   - Brain: Coordinates both voluntary and involuntary actions.
   - Spinal cord: Carries information from the whole body to the brain and from the brain to the whole body. It also controls the reflex actions.
3. The functions of the peripheral nervous system are to send signals from the body to the central nervous system, and to send signals from the central nervous system to other parts of the body.

4. A dysfunctional nervous system may cause conditions such as Bell's palsy and other body imbalance problems.
5. The nervous system can be taken care of by practising the following steps:
   - eat a balanced diet
   - avoid drinking alcoholic beverages
   - get enough sleep
   - wear protective gears
   - maintain good posture while doing daily activities

MIND TEST

Answer all questions in the Science exercise book.

1. Label the male reproductive organs below and state their functions.

(a) Organ: _____

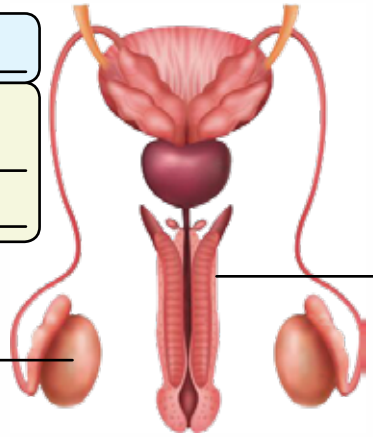
Function: _____

_____

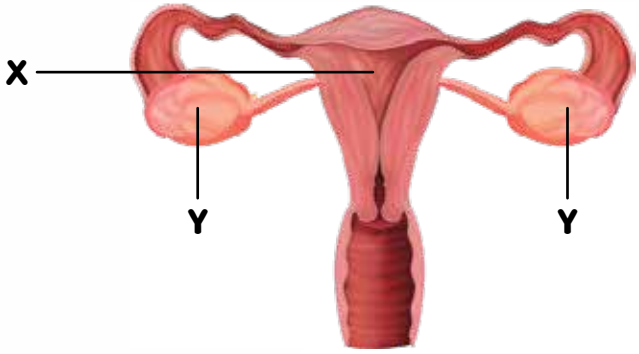
(b) Organ: _____

Function: _____

_____



2. The diagram below shows the female reproductive organs.



(a) What happens after an ovum that is produced by Y fuses with a sperm?
(b) What happens in X?
(c) Due to health problems, a woman had to have both of her Y removed. Does she have an opportunity to give birth to a child? Explain your answer.

3. Complete the process of human fertilisation until birth.

(a) The penis of the male parent releases (i) _____ into the (ii) _____ of the female parent.

(b) The sperms (i) _____ towards an (ii) _____ and one sperm will (iii) _____ with the ovum.

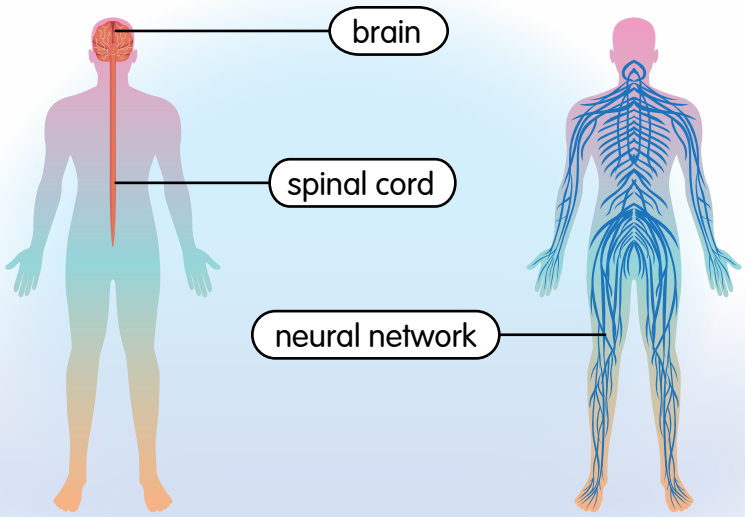
(c) The (i) _____ that has been fertilised by a sperm is known as a (ii) _____.

(d) The (i) _____ develops in the uterus of the mother to form a (ii) _____.

(e) The (i) _____ remains in the uterus of the mother for about (ii) _____ months until its organs are completely developed.

(f) The mother gives birth to the (i) _____ which is now known as a (ii) _____.

4. Name the human nervous system below.



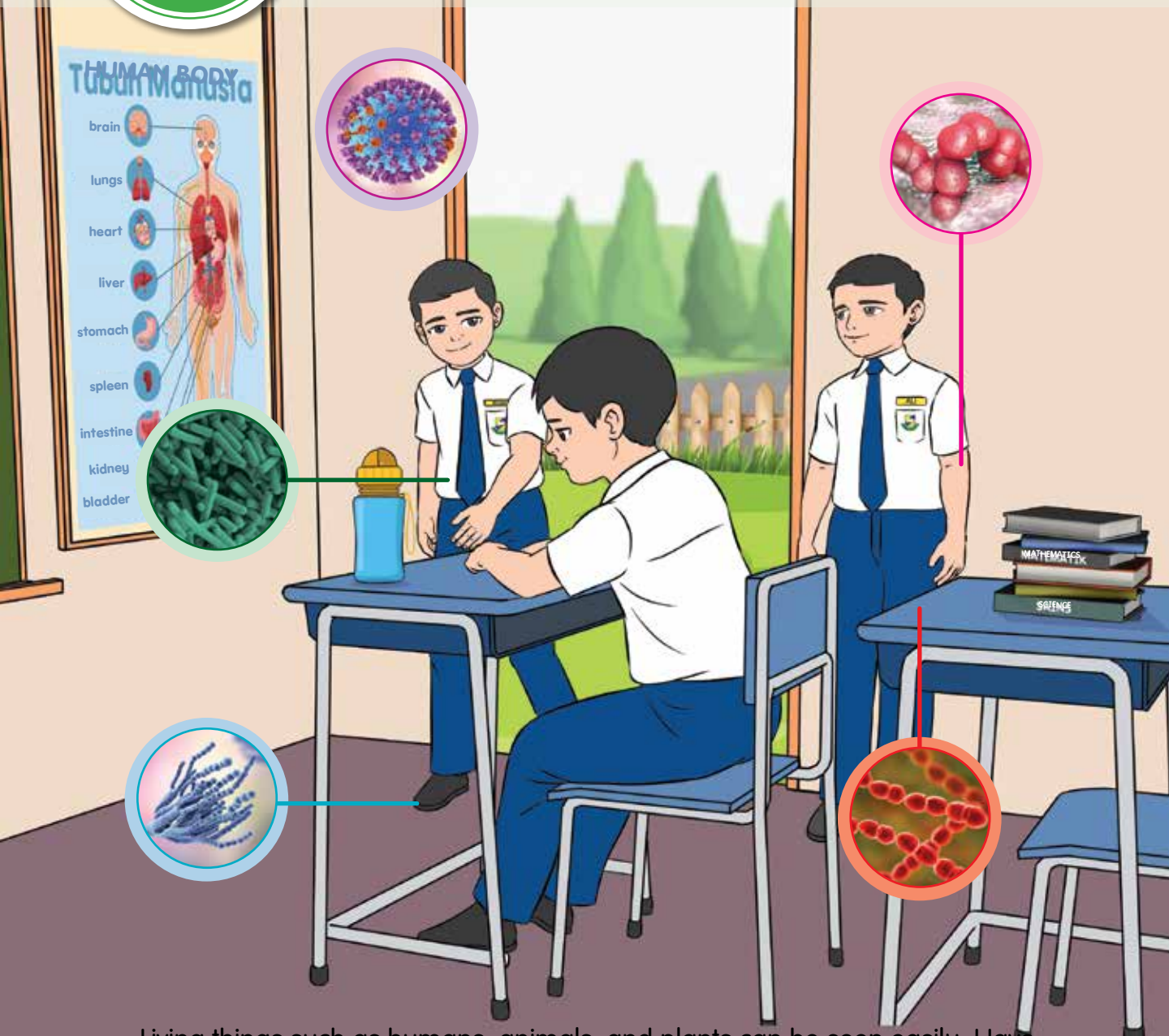
(a) _____ (b) _____

5. Explain the type of nervous system and the signal pathway involved in each situation.

Situation A: Zaimi immediately pulled his hand away when he touched a hot kettle.
Situation B: Siti heard her phone ring and she picked it up.

UNIT 3

MICROORGANISMS



Living things such as humans, animals, and plants can be seen easily. Have you seen other living things such as the ones shown in each circle above? These living things cannot be seen with our naked eyes and can be found in soil, water, and air, as well as in our bodies. What are these living things?

Microorganisms

Have you heard of the word microorganism? The word microorganism is a combination of the words micro and organism. Micro means very small or tiny and cannot be seen with the naked eyes. Organism means living thing. Therefore, what does microorganism mean?

Microorganisms are very small living things that cannot be seen with our naked eyes.

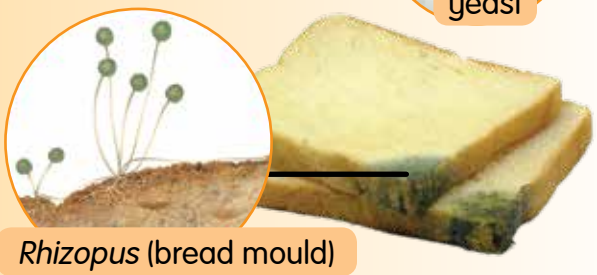
Most microorganisms can only be seen using specialised equipment called microscopes. Microorganisms can survive on their own or in groups. What are the types of microorganisms that exist around us?

Fungi

Fungi can be found in the air, water, soil, and on other living things. They survive by decomposing or breaking down the objects they live on. The decomposed matter is absorbed as nutrients. Fungi reproduce by producing spores. Examples of fungi are mould, yeast, and *Penicillium*.

Penicillium

yeast



Rhizopus (bread mould)

Bacteria

Spirillum

Streptococcus

Escherichia coli

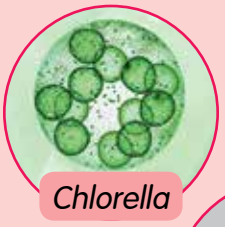
Salmonella

Bacteria exist in spherical, rod or spiral form. They can be found in the air, water, soil, and on other living things such as humans, animals, and plants. They live by absorbing nutrients from other living things. Examples of bacteria are *Spirillum*, *Streptococcus*, *Escherichia coli*, and *Salmonella*.

- Fungi is a group of fungus.
- Bacteria is a group of bacterium.

Algae

Algae has the characteristics of plants. They have chlorophyll and can produce their own food through the photosynthesis process. Examples of algae are *Chlorella*, *Chlamydomonas*, and *Volvox*.



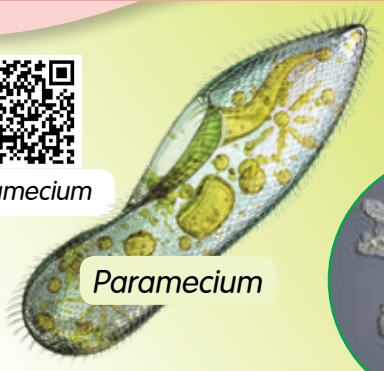
Chlorella

Volvox

Chlamydomonas

Volvox

Paramecium



Paramecium

Amoeba

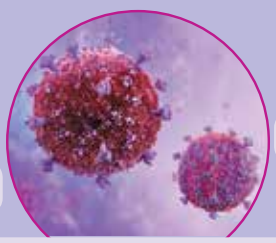
Protozoa

Protozoa have the characteristics of animals because they can move to find food. They can mainly be found in ponds, lakes, and rivers. Examples of protozoa are *Paramecium* and *Amoeba*.

Virus

Viruses are the smallest microorganisms. They can only live and reproduce when they are inside other living things. Viruses can only be seen using electron microscopes. Examples of viruses are Bacteriophage, *Human Immunodeficiency Virus (HIV)*, and *Influenza virus*.

Bacteriophage



Influenza virus

Human Immunodeficiency Virus (HIV)

State the meaning of microorganisms and explain the different types of microorganisms found around us.

SCIENCE INFO

Coronavirus (CoV) is a type of virus that causes respiratory infections. In 2019, the latest coronavirus was identified in China and it is known as Coronavirus disease 2019 (COVID-19). The virus caused a lot of human deaths.

Life Processes of Microorganisms

Just like all other living things, microorganisms go through life processes.

LET'S TEST

Life Processes of Microorganisms

Activity 1 : Microorganisms Breathe

Group Activity

21st Century Learning Skills

Aim: To prove that microorganisms breathe

Apparatus and materials: sugar, yeast, warm water, balloon, beaker, teaspoon, tablespoon, plastic bottle, string, ruler, filter funnel

Steps:

1. 

Measure 250 mℓ of warm water and pour it into a plastic bottle.

2. 

Then, add two tablespoons of sugar and three teaspoons of yeast into the bottle using a filter funnel.

3. 

Fix a balloon onto the bottle as shown in the picture.

4. 

Shake the bottle.

5. 

Take turns to record the circumference of the balloon at the intervals of 10 minutes for 30 minutes.
Record your observation in a table.

6. Present your findings to the class.

Questions:
1. What can you observe from the circumference of the balloon?
2. Give an inference for your observation.
3. What can you conclude from this activity?

Activity 2: Microorganisms Move

Group Activity

Aim: To prove that microorganisms move

Be careful when handling cover slips.

Apparatus and materials: microscope, dropper, glass slide, cover slip, beaker, petri dish, water collected from a pond or a river

Steps:

1. 

Take some water sample collected from a pond or a river using a dropper. Place a drop of the water sample on a glass slide. Cover it with a cover slip.

2. 

Place the glass slide on the stage of a microscope.

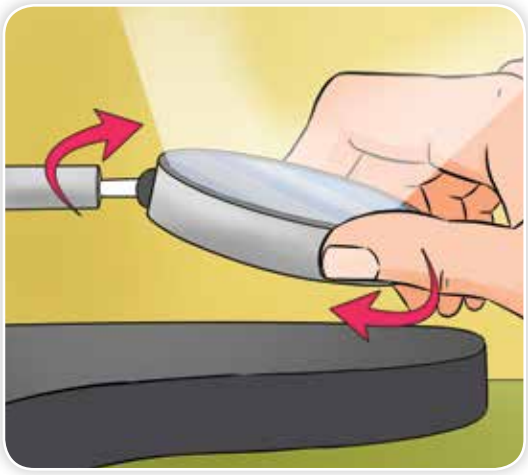
3.

Adjust the objective lens to obtain a clear image of the microorganisms.

4.

Move the slide to the centre until a clear image is viewed.

5.



Adjust the position of the mirror until you are able to focus on the image of the microorganisms.

6.

Observe the position of the microorganisms that you are able to see. Sketch their positions every minute for three minutes. Discuss your findings.

Questions:

1. Did the position of the observed microorganisms change?
2. What can you conclude from this activity?

movement of microorganisms

Place a small piece of cotton on the glass slide after placing a drop of water. This makes observing the movement of the microorganisms easier.

Activity 3: Microorganisms Grow

Aim: To prove that microorganisms grow

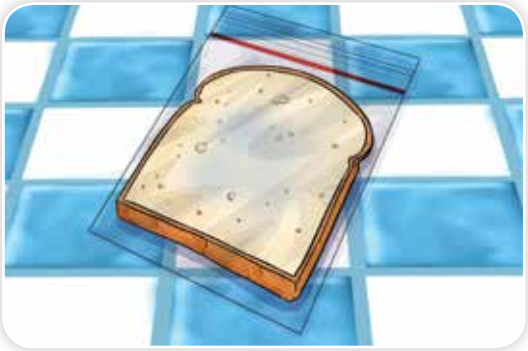
Apparatus and materials: ziplock bag, magnifying glass, spray bottle, a slice of bread, water

Steps:

Avoid touching the bread mould with your hands.

1. 

Spray some water on both sides of the bread.

2. 

Put the bread in a ziplock bag. Remove some air from inside the bag and seal it carefully.

3. 

Place the bag containing the bread in a dark place such as in a cupboard or a drawer.

4. 

Start observing the surface of the bread on the fifth day until the seventh day. Observe the size of the bread mould.

Questions:

1. What can you observe on the surface of the bread?
2. What is the change in the size of the bread mould from the fifth to the seventh day?
3. What can you conclude from this activity?

After conducting the experiments, Chua and his friends shared their observations.

The circumference of the balloon increased.

I managed to see the protozoa move and change their positions.

The size of the bread mould increased.

From these activities, what conclusions can you make regarding the life processes of microorganisms?

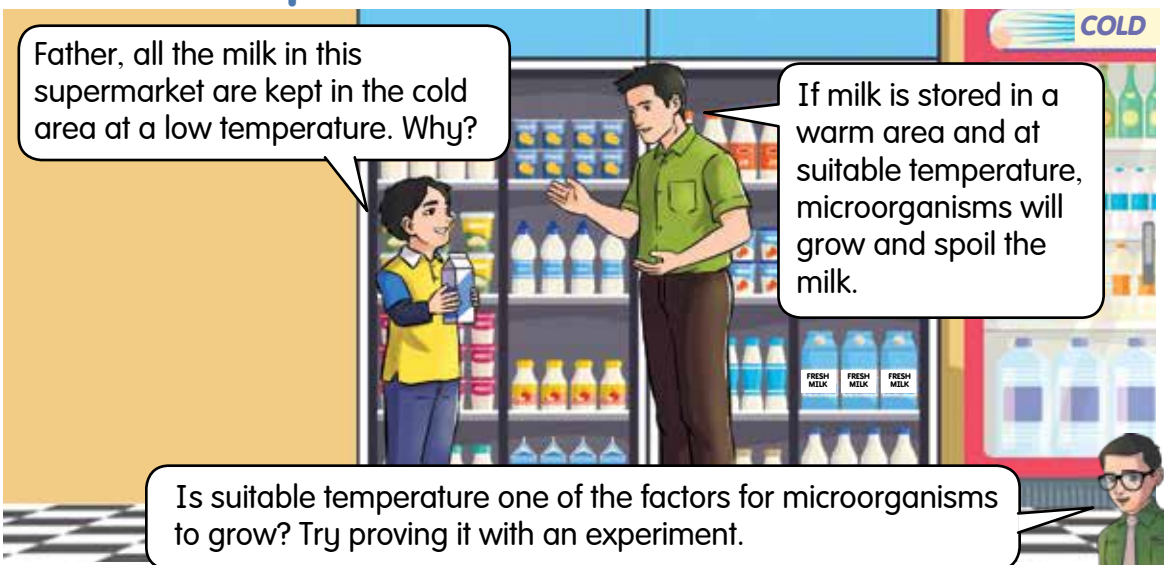
Factors Affecting the Growth of Microorganisms

Mr Hadi, why doesn't the yeast in these packets grow?

The yeast in the packets do not grow because they are still inactive. Microorganisms will grow when all the conditions needed for them to grow are met.

What are the conditions needed for microorganisms to grow? Look at the situation below.

Suitable Temperature



Father, all the milk in this supermarket are kept in the cold area at a low temperature. Why?

If milk is stored in a warm area and at suitable temperature, microorganisms will grow and spoil the milk.

Is suitable temperature one of the factors for microorganisms to grow? Try proving it with an experiment.

EXPERIMENT

Suitable Temperature

1. **Aim:** _____
2. **Problem statement:** Does suitable temperature affect the condition of the milk?
3. **Hypothesis:** _____
4. **Variables:**
   (a) manipulated: _____
   (b) responding: _____
   (c) constant: _____
5. **Apparatus and materials:** Bunsen burner, two bottles with caps, thermal flask, beaker, fresh milk
6. **Steps:**
   (a) Prepare three glasses that are filled with the same amount of fresh milk.
   (b) Pour the milk from the first glass into a bottle labelled A. Close the bottle and keep it in a refrigerator.
   (c) Pour the milk from the second glass into a bottle labelled B. Close the bottle and keep it at room temperature.
   (d) Pour the milk from the third glass into a beaker. Boil the milk using the Bunsen burner. Then, pour it into the thermal flask. Close the thermal flask and leave it on the table.
   (e) Observe the condition of the milk daily for three days.
   (f) Record your observation in a table.

7. **Data:** _____
8. **Interpreting the data:**
   (a) _____ temperature spoils the condition of the milk the fastest.
   (b) _____ temperature is suitable for microorganisms to grow.
9. **Conclusion:**
   (a) The hypothesis is (accepted/not accepted).
   (b) The condition of the milk will _____ if the temperature of the milk is _____.

Other than suitable temperature, what other factors affect the growth of microorganisms? Understand the situations below.

Presence of Water

Why does dried bread last longer than fresh bread? Does the absence of water cause the microorganisms not to grow?

That was what I was thinking too. Fresh bread has moisture which makes it easier for mould to grow.

Let's conduct an experiment using two pieces of dried bread. We use two pieces of dried bread labelled A and B but only B is dipped in water.

bread A

bread B

Based on the suggested materials, plan and conduct an experiment to investigate if the presence of water has an effect on the growth of microorganisms.

Presence of Air

These asparagus are vacuum packed. Do vacuum packed vegetables last longer?

Yes. In my opinion, vegetables last longer when there is no air in the vacuum pack. When there is no air, microorganisms cannot grow.

I agree with your hypothesis. Let's conduct an experiment using apple slices. Several apple slices will be vacuum packed while the other slices will not be vacuum packed.

How does the presence of air affect the growth of microorganisms?

Presence of Nutrients

Why do we need to add sugar into the yeast in the previous experiment?

I think that yeast needs nutrients to grow and become active.

Let's investigate the growth of bacteria in distilled water and fresh milk. Fresh milk contains nutrients while distilled water does not contain any nutrients.

distilled water

fresh milk

Does the presence of nutrients affect the growth of bacteria? Observe the growth of bacteria in the experiment above after three days.

Suitable Acidity

How do preserved mangoes remain fresh for a longer time?

I think that the acidity of the preserved liquid is unsuitable for the growth of microorganisms.

Let's conduct an experiment using apple slices to investigate whether acidity affects the growth of microorganisms. One apple slice is soaked in vinegar while the other slice is soaked in tap water.

Based on all the conducted experiments, what conclusions can you make regarding the factors that affect the growth of microorganisms?

Uses of Microorganisms

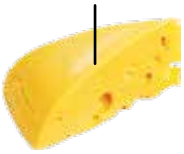
Did you know that bread is soft and fluffy because of the actions of microorganisms? Some actions of microorganisms by fungi, bacteria, algae, and protozoa are useful to us.

Wow, this bread is so soft and fluffy!

How do the actions of microorganisms benefit us?

Manufacture of food products

Bacteria and fungi are used to make cheese.



Fungi are used to make tempeh.

Bacteria are used in manufacturing yogurt.

Yeast is used to make bread and fermented rice.

Production of medicine

Some fungi are used to produce penicillin, an antibiotic which prevents the growth of harmful bacteria.

Some fungi, bacteria, and viruses are used to produce vaccines that stimulate the production of antibodies to fight against harmful viruses.

Production of organic fertilisers

Animal faeces mixed with sawdust is decomposed by bacteria to produce organic fertiliser.

Treatment of sewage

Bacteria help the decomposition process of faeces by breaking down organic waste found in sewage treatment plants.

Harmful Effects of Microorganisms

The actions of microorganisms also have harmful effects.

Cause food spoilage

Fungi that grow on food cause food to turn bad.

Cause tooth decay

Bacteria in the mouth produce acid from sugar and food particles. The acid causes tooth decay.

Cause food poisoning

Food poisoning can occur due to the actions of microorganisms such as *Salmonella* through contaminated sources.

Cause damage to plants

Fungi that grow on leaves can disrupt the process of photosynthesis.

Cause infectious diseases

Influenza

Influenza is also known as flu. It occurs when the body is infected with the *Influenza virus*.

Mumps

Mumps is a type of disease caused by viruses. It causes swelling of the cheek and neck.

Ringworm

Ringworm is a skin infection caused by fungi.

Measles

Measles is a disease caused by a virus.

What are other infectious diseases caused by microorganisms?

Explain the effects of microorganisms in our daily lives.

FUN ACTIVITY

Mould Terrarium

Group Activity

Apparatus and materials: clear container with a lid, food scraps, water, spray bottle

1. Do not open the container lid.
2. Do not touch the microorganisms with your hands.

Steps:

1. 

Arrange the food scraps in a clear container. Ensure some distance between the food scraps.

2. 

Spray some water on each food scrap. Close the lid properly.

3. Predict your observation based on the following questions.
   - Which food scrap will spoil first?
   - What type of microorganism will be observed?
4. Take turns to answer these questions and record them on a piece of paper.
5. 

Each group will place their terrarium at different places. Observe the terrarium every three days for six days. Compare the observation with your prediction.

Questions:

1. What microorganism can you observe?
2. What did the microorganism do to the food scraps?
3. Which food scrap had the most growth of microorganism? Why?

3.1.1, 3.1.5, 3.1.6

Guide the pupils to correctly discard the terrarium.

FUN SCIENCE

Making Tempeh

Make tempeh using 500 g of soya beans, half teaspoon of tempeh starter, ziplock bag, and water.

Be careful when handling gas stoves.

Steps:

1. 

Soak some soya beans overnight in warm water. Then, remove the soya bean hulls.

2. 

Boil the soya beans until they are ¾ cooked or boil for 45 minutes to 1½ hours.

3. 

Leave the soya beans to cool. Then, sprinkle the tempeh starter and mix well.

4. 

Make holes on a ziplock bag. Fill it with the soya beans and seal it.

5. 

Keep the sealed soya beans at room temperature with good air circulation. Observe the tempeh after 36 to 48 hours.

MIND REFLECTION

1. Microorganisms are very small living things that cannot be seen with our naked eyes.

2. There are five types of microorganisms:
   - fungi
   - bacteria
   - algae
   - protozoa
   - virus

3. The life processes of microorganisms are as follows:
   - breathe
   - move
   - grow

4. Factors that affect the growth of microorganisms are as follows:
   - suitable temperature
   - presence of water
   - presence of air
   - presence of nutrients
   - suitable acidity

5. The actions of microorganisms have the following effects:

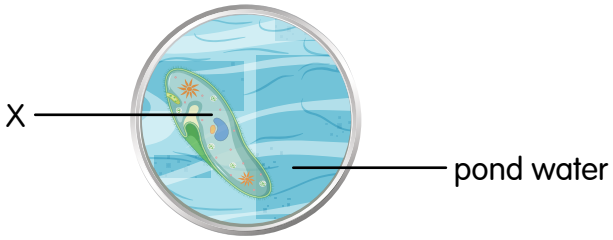
Benefit	Harm
• manufacture of food products • production of medicine • production of organic fertilisers • treatment of sewage	• cause food spoilage • cause tooth decay • cause food poisoning • cause damage to plants • cause infectious diseases

MIND TEST

Answer all questions in the Science exercise book.

1. State the types of microorganisms that fit the characteristics given below.
   (a) the smallest
   (b) produce their own food
   (c) have animal characteristics
   (d) reproduce through spores
   (e) are in spherical, rod or spiral forms

2. The picture below shows a drop of pond water that is observed under a microscope.



   (a) Name X.
   (b) Predict the position of X after 5 minutes.
   (c) Give an inference for your answer in 2(b).

3. The picture shows three balls of dough that have been left for 20 minutes. The initial size of the balls of dough and the amount of sugar added to each ball of dough are the same.

   (a) State one observation.
   (b) Give an inference for your observation in 3(a).
   (c) Name the life process of the microorganism based on the situation above.

   (d) The picture below shows a ball of dough that is added with yeast but not sugar.

   Does the size of the ball of dough increase after 20 minutes? Why?

4. Produce a graphical presentation about the effects of the actions of microorganisms in our daily lives based on your creativity.

UNIT 4

INTERACTION AMONG LIVING THINGS

Observe this picture of a wetland habitat. How many living things can you identify in the picture? All the living things in this habitat live together and interact with each other to survive. How do they interact?

Interaction Among Living Things

Interaction among living things is a **relationship among living things that depend on each other** to obtain basic needs to continue living.

Interaction Among Animals

There are three types of interactions among animals. They are prey-predator, competition, and symbiosis.

Prey-predator

cheetah

The cheetah is a **predator** that hunts the gazelle.

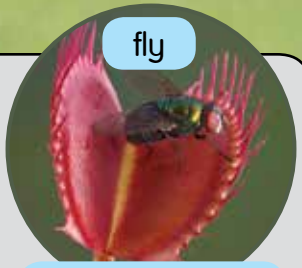
gazelle

The gazelle is a **prey** that is eaten by the cheetah.

A **predator** is an animal that hunts other animals for food. The animal being hunted or eaten by the predator is the **prey**.

SCIENCE INFO

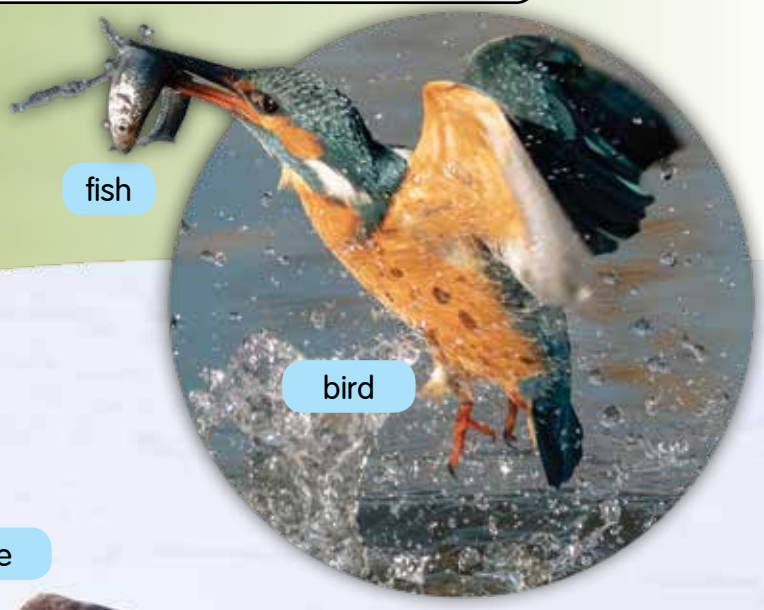
The prey-predator interaction also occurs among animals and plants. For example, the interaction between the fly and the Venus flytrap plant. Venus flytrap is the predator to small insects such as flies.

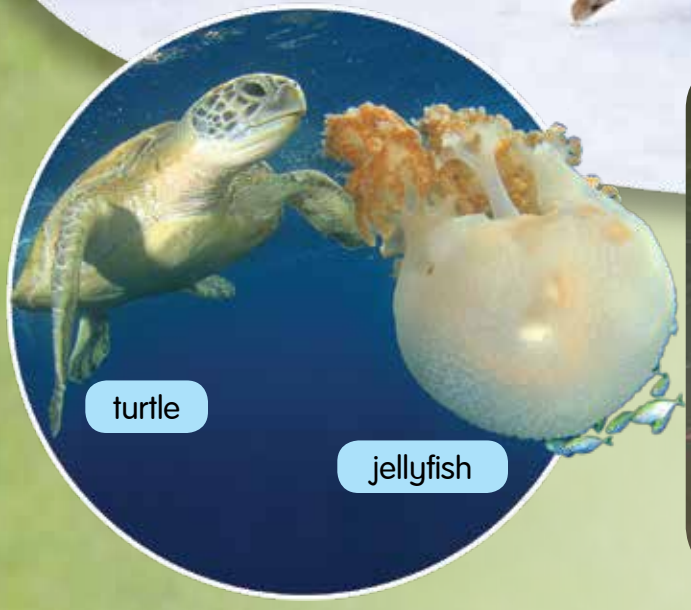


fly

Venus flytrap

Observe the interactions below. State the **prey** and the **predator** in each interaction.

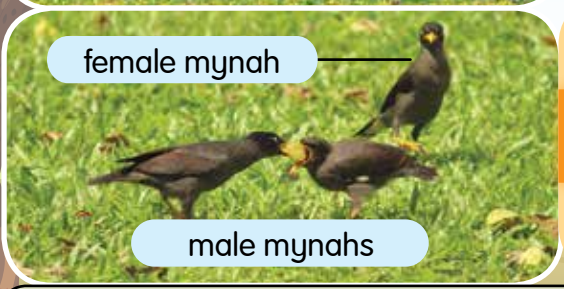




Competition Among Animals

When there are limited resources of basic needs, animals will **compete** with each other in order to survive.

Competition among animals of the same species is known as **intraspecies competition**. Competition among animals of different species is known as **interspecies competition**.

Intraspecies Animals	Factors of Competition	
 hyenas	Hyenas compete for food.	Food
 zebras	Zebras compete for water.	Water
 hippopotamuses	Hippopotamuses compete to defend their territory.	Shelter or territory
 female mynah, male mynahs	Male mynahs compete for female mynahs to mate.	Mate

Intraspecies competition occurs when the sources of food, water, shelter or territory, and mate are limited.

What are the factors of competition among animals?

Interspecies Animals

Vultures compete with lions for food.

Zebras compete with gnus for water.

An oystercatcher chases a seagull out of its territory.

What is the difference between intraspecies and interspecies competitions?

Interspecies competition occurs when the sources of food, water, shelter or territory are limited.

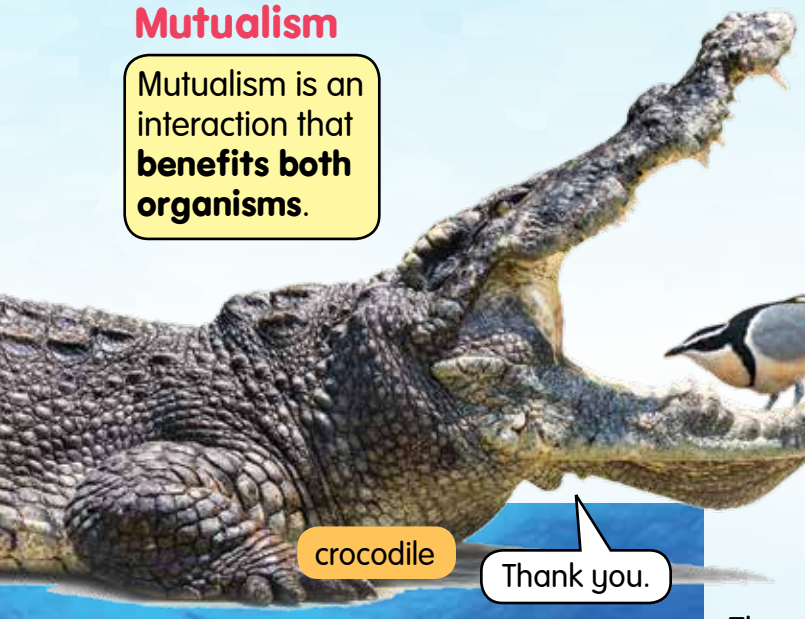
Explain the factors of competition among intraspecies and interspecies animals. Give examples.

Symbiosis Among Animals

Symbiosis is a close relationship between two animal species. There are three types of symbiosis. They are known as **mutualism**, **parasitism**, and **commensalism**.

Mutualism

Mutualism is an interaction that **benefits both organisms**.

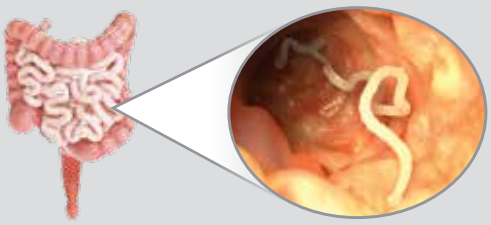


The crocodile opens its mouth to allow the bird to come and feed on the food stuck between the crocodile's teeth. At the same time, the crocodile's teeth are being cleaned.

The clownfish hides between the tentacles of the sea anemone. The anemone's sting protects the clownfish from being eaten by its predator. At the same time, the clownfish chases away the anemone's predators, such as the butterflyfish.

SCIENCE INFO

Did you know that parasitism also takes place between animals and humans?



Tapeworm is a parasite that absorbs food from the intestines such as the human intestine. The host will fall ill or lose weight.

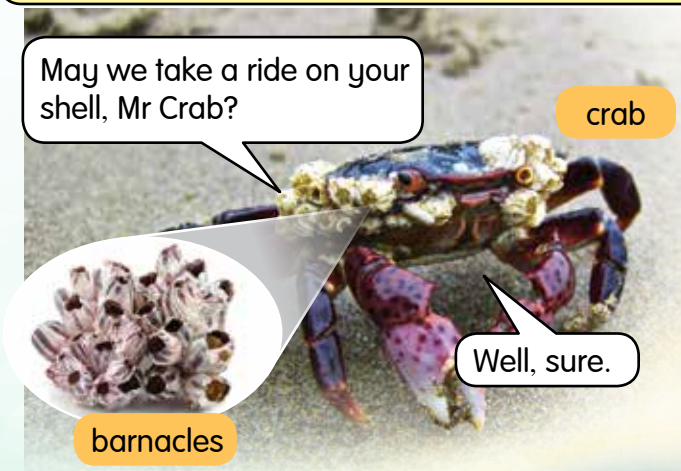
Parasitism

Parasitism is an interaction that **benefits one organism** and **harms the other**. In this interaction, the organism that gains the benefits is called the parasite, while the one that is harmed is called the host.

Ticks suck the blood of their hosts, such as this cat. The cat will feel itchy and lose its blood.

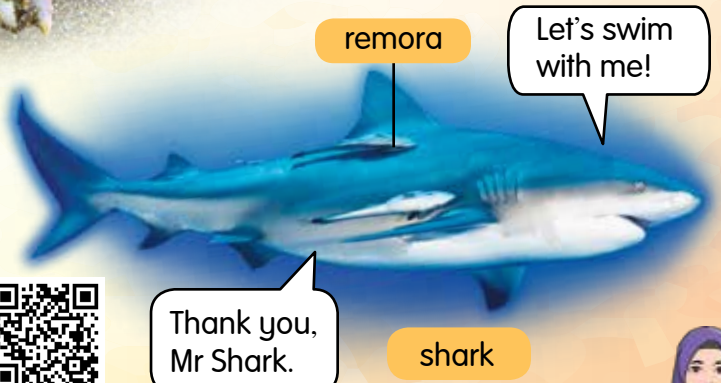
Commensalism

Commensalism is an interaction that **benefits one organism** but **does not harm nor benefit the other**.



Barnacles get free transport when they grow on the shell of crabs.

Remoras attach themselves to the body of sharks. They get free transport, protection, and food scraps from the mouth of sharks.



remoras and sharks

Explain the types of symbiosis for different animals. Give examples.

FUN ACTIVITY

Drama on Interaction

Group Activity

Apparatus and materials: manila card, coloured card, stapler, scissors, box, glue, rubber bands, A4 paper, hole punch

Steps:

1. Create a hat using a manila card and a stapler. Make a hole on both sides of its base and connect the holes using rubber bands.
2. Cut out an animal shape from a coloured card and paste it on the hat.
3. Make a few more hats with different animal cut-outs.
4. Cut an A4 paper into smaller pieces and write a type of interaction. For example, "prey-predator". Roll them up and place them in a box.
5. The group leader will randomly pull a rolled piece of paper from the box and choose a friend to act out the type of interaction among animals. The group members will continue this game by pulling out another rolled piece of paper and so on.

Be careful when using scissors.

Questions:

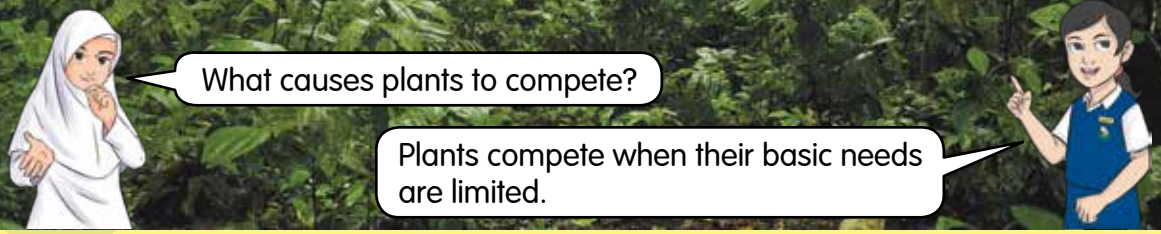
1. State the definition of interaction among living things.
2. Describe the types of interactions among living things that you have learned.
3. What are the factors of competition among animals?
4. State the types of symbiosis among animals.

4.1.1, 4.1.2, 4.1.3, 4.1.4

Interaction Among Plants

Plants in a particular habitat also interact with each other to continue living. There are two types of interactions among plants. They are known as **competition** and **symbiosis**.

Competition Among Plants



LET'S TEST

Plants Compete

Activity 1

Aim: To investigate space as a factor that causes competition among plants

Apparatus and materials: small-sized flowerpot, big-sized flowerpot, garden soil, 30 green bean seeds, water

Steps:

1. Plant 15 green bean seeds in a small-sized flowerpot and plant another 15 green bean seeds in a big-sized flowerpot.
2. Water the seeds in both pots with the same amount of water every day.
3. Compare the growth of the green bean seedlings in both pots after three weeks.

Questions:

1. What can you observe about the growth of the green bean seedlings in the small-sized and big-sized flowerpots? Why such changes occur?
2. State a factor that causes the difference in the growth of the green bean seedlings in both pots.

Green bean seeds can be substituted with chilli seeds or okra seeds.

4.1.2, 4.2.3

Activity 2

Aim: To investigate water as a factor that causes competition among plants

Apparatus and materials: two small-sized flowerpots, garden soil, 13 green bean seeds, water

Steps:

1. Label two flowerpots as A and B.
2. Plant 10 green bean seeds in pot A and three green bean seeds in pot B.
3. Water the seeds in pot A and B with the same amount of water every day.
4. Carefully remove the green bean seedlings in pots A and B after three weeks. Observe the root growth of the seedlings in both flowerpots.

Questions:

1. Compare the root growth of the green bean seedlings in pot A and B. What can you observe?
2. Why do such changes occur?
3. What is the factor that causes the green bean seedlings to compete?

Activity 3

Aim: To investigate sunlight as a factor that causes competition among plants

Apparatus and materials: two small-sized flowerpots, two boxes, garden soil, 18 green bean seeds, water

Steps:

1. Label two flowerpots as A and B. Plant 15 green bean seeds in pot A and three green bean seeds in pot B.
2. Prepare two empty boxes.
3. Make a small hole each at the top part of both boxes.
4. Cover pot A and B with the boxes. Ensure that the small holes are positioned upwards.
5. Water the seedlings every day using water tubes that are inserted through the holes on the top part of both boxes.
6. Remove the boxes after three weeks. Observe the growth of the green bean seedlings.

Questions:

1. Compare the root growth of the green bean seedlings in pot A and B. State your inference.
2. What is the factor that causes the green bean seedlings to compete?

Activity 4

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

Apparatus and materials: two flowerpots, garden soil, 30 green bean seeds, fertiliser, water

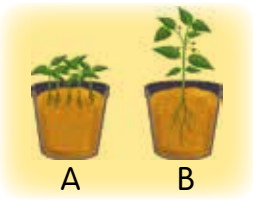
Steps:

1. Label two flowerpots as A and B.
2. Plant 15 green bean seeds at a distance of 5 cm from each other in pot A and B.
3. Spread some fertiliser evenly onto the soil of pot B only.
4. Water the seeds with the same amount of water every day.
5. Compare the growth of the green bean seedlings in both pots after three weeks.

Questions:

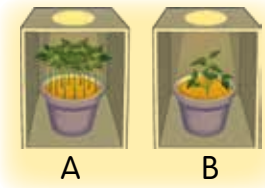
1. Compare the growth of the green bean seedlings in pot A and B. State your inference.
2. What is the factor that causes the green bean seedlings to compete in pot A?

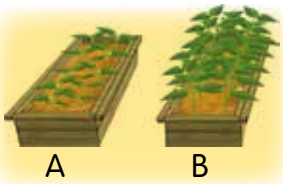
The seedlings in this small-sized flowerpot have to compete for limited space.



It seems that the roots of the green bean seedlings in pot B grow healthily due to the lack of competition for limited water.

The seedlings in pot A grow taller because they have to compete for limited sunlight.



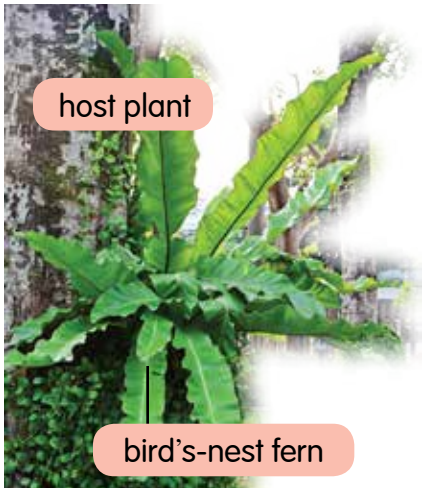


The seedlings in pot A have to compete for limited nutrients.

Explain the factors of competition among the plants.

Symbiosis Among Plants

Symbiosis is a close relationship between two plant species. There are two types of symbiosis. They are known as **commensalism** and **parasitism**.



Commensalism

Commensalism is an interaction that **benefits one organism** but **does not harm nor benefit the other**.

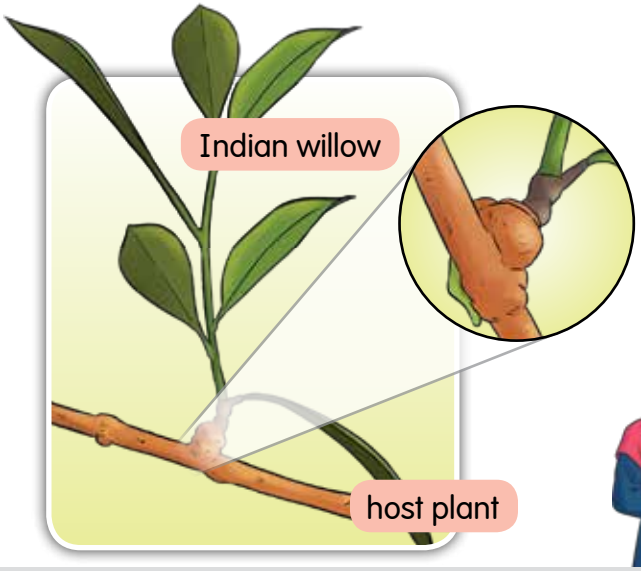
Bird's-nest ferns grow on large branches of the host plant to obtain support and sunlight. They do not harm the host plant because the roots and stem do not penetrate the host.

Orchids grow on the trunk of the host plant for support, sunlight, and nutrients from their surrounding. At the same time, the host plant is not harmed nor does it gain any benefits.

Parasitism

Parasitism is an interaction that **benefits one organism** and **harms the other**. In this interaction, the organism that gains the benefits is called the parasite, while the one that is harmed is called the host.

Certain plants such as the Rafflesia cannot undergo the photosynthesis process. Thus, the Rafflesia needs to grow on a host plant. This harms the host plant because the Rafflesia absorbs water and nutrients from it.



Indian willow grows on the host plant to gain nutrients and water from it. This interaction is harmful to the host and it can eventually cause the branch of the host plant to die.

Describe the types of symbiosis among plants. Give examples.

The Importance of Interaction Among Living Things to the Ecosystem

Why do living things need to interact with each other?

Interaction in the form of competition and prey-predator can **control the population of organisms** in a habitat.

The rat population in oil palm plantations can be controlled with the presence of predators such as owls.

The living things in an ecosystem interact with one another to **ensure the survival of their species.**

In a pond, the large fish depend on the small fish to ensure the survival of their species. How do the small fish and the tadpoles ensure the survival of their species?

Competition among plants allows the most resilient plants to survive and produce quality breed of seedlings. Thus, **natural resources** can be maintained.

In a forest habitat, the trees that are best adapted will live and multiply.

All types of interactions among living things in a habitat are important to **maintain the balance of the nature.**

Observe a particular habitat around you. Creatively, describe the importance of the interaction among living things to the ecosystem using your favourite media.

FUN ACTIVITY

QR Code of a Video on Interaction Among Plants

Group Activity

21st Century Learning Skills

Apparatus and materials: computer, Internet access, printer, A4 paper

Steps:

1. Find and watch a video on the interaction among plants and its importance using the Internet.
2. Share the video link by generating a QR code of the video using a suitable QR generator website.
3. Print and put up the QR code at one corner of your class.

Questions:

1. State the factors of competition among plants.
2. Explain the types of symbiosis that take place among plants.

4.1.1, 4.2.2, 4.2.3

FUN SCIENCE

An Interaction Among Living Things Pop-up Card

Create an attractive and colourful pop-up card creatively to show the interaction among living things. You can search the Internet or look in newspapers or magazines for pictures of animals.

MIND REFLECTION

1. Interaction among living things is a relationship among living things that depend on each other.
2. There are three types of interactions among animals:
   - prey-predator
   - intraspecies and interspecies competitions
   - symbiosis which are mutualism, parasitism, and commensalism
3. There are two types of interactions among plants:
   - competition to obtain water, sunlight, nutrients, and space
   - symbiosis which consists of commensalism and parasitism
4. The importance of interaction among living things to the ecosystem are as follows:
   - to control the population of organisms
   - to ensure survival of the species
   - to maintain the growth of natural resources
   - to restore the balance of nature

MIND TEST

Answer all questions in the Science exercise book.

1. Complete the definition of interaction among living things below.

Interaction among living things is a (a) _____ among living things that (b) _____ on one another.

2. Match the type of interaction with the correct information.

Type of Interaction		Situation
Prey-predator	•	• Compete for limited number of mates
Intraspecies competition	•	• Cheetahs hunt gazelles
Interspecies competition	•	• Competition between vultures and lions
Symbiosis	•	• Remoras get free transport from sharks

3. An interaction that benefits one organism but does not benefit nor harm the other organism can be explained by the symbiosis between:

(a) cats and ticks.
(b) crocodiles and birds.
(c) crabs and barnacles.
(d) clownfish and sea anemones.

4. Complete the types of symbiosis between animals in the table below.

Types of symbiosis		
_____	_____	_____
Benefits both organisms	Benefits one organism but harms the other.	Benefits one organism but does not benefit nor harm the other.
Example: _____	Example: _____	Example: _____

5. Explain the interaction among plants by stating the types of interactions of specific plants.

UNIT 5

PRESERVATION AND CONSERVATION

The pupils of 6 Bestari had the opportunity to visit a virtual reality exhibition. They saw what Earth was like during the prehistoric times. Earth looked the same but they had never seen the animals which were exhibited. Why is that so?

Extinct Animals

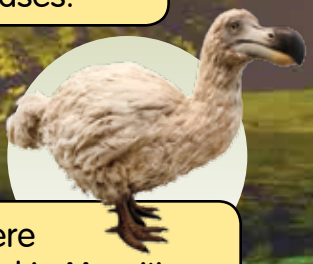
Have you ever seen these animals. These animals have long been extinct. What does that mean?

Extinct means no longer exists on Earth.

Let us discover these animals that once lived on Earth.

Tasmanian wolves became extinct due to extreme hunting, loss of habitat, and epidemic diseases.

Mammoth



The **dodo birds** were flightless birds found in Mauritius. They became extinct due to excessive hunting by sailors while their eggs were eaten by rats and cats.

Mammoths resembled elephants. They existed during the ice age. Their number was thought to have reduced due to extreme weather change and finally became extinct because they were hunted by humans.

SCIENCE INFO

Brontosaurus measured 20.1 metres long from their heads to tails and they weighed 34.5 tonnes. Meanwhile, elephants usually have heights around 6.5 metres and they weigh 5 tonnes.

Tyrannosaurus Rex

Tyrannosaurus Rex

Dinosaurs became extinct due to extreme weather change.

The hindquarters of a **quagga** resemble a horse while the front part of the body resembles a zebra. It was hunted for its skin and meat until it became extinct.

Sabre-toothed tigers had very long canines, up to 30 cm. This animal also lived during the ice age and became extinct due to extreme weather change.

Sabre-toothed tiger

Name these extinct animals. What other extinct animals can you name?

Animals and Plants That Are Facing the Threat of Extinction

Did you know that there are millions of animal and plant species living on Earth? However, the number of animals and plants are declining each day. When their numbers keep on declining and they are in danger of becoming extinct, we say that these animal and plant species are facing the threat of extinction.

pitcher plants

What animal and plant species are at risk of becoming extinct?

slipper orchids

hornbills

tongkat ali plant

Rafflesia

elephant

Malayan tiger

meranti tree

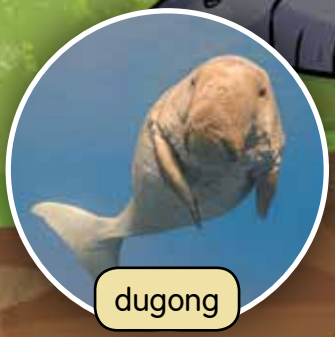
cengal tree

keruing tree

orangutan

panda

rhinoceros



dugong

Malayan tapir

Why are large animals more likely to be at risk of extinction?

List other animals and plants that are also facing the threat of extinction.

Factors That Cause the Threat of Extinction to Animals and Plants

Did you know that human activities are the greatest threat to animals and plants? Excessive and uncontrolled use of natural resources cause their numbers to decline.

Habitat destruction

Humans build roads and develop new towns. These activities destroy the natural habitat of animals and plants. Forests are also burned to make way for planting new crops.

new town development

road construction

forest burning

Illegal hunting

Humans excessively hunt and harvest different types of animals and plants to make **medicine**, **food**, **ornaments**, and **clothes**.

Rafflesia is sold as traditional medicine

pangolin is sold as food

expensive ornaments made from elephant tusks

handbag made from crocodile skin

coat made from tiger skin

Pollution

Disposing of trash such as plastic waste can trap animals. This can also cause **flash floods.**

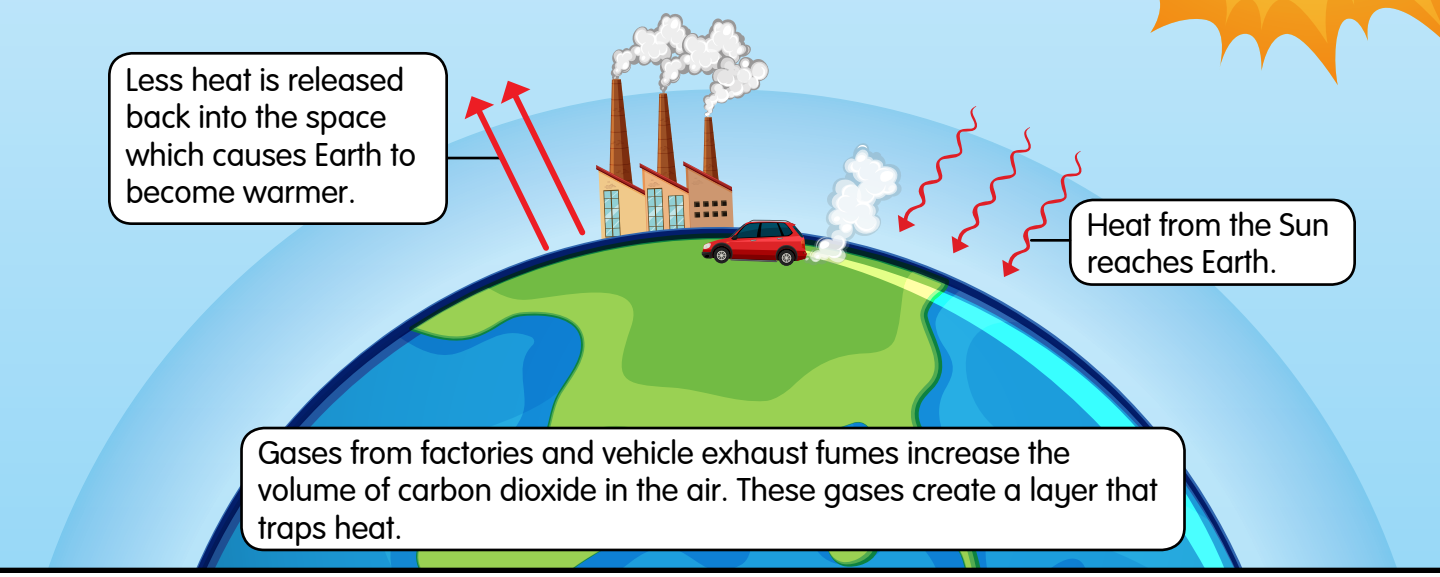
Oil spill and toxic waste can kill aquatic animals and plants in the sea and at coastal areas.

Natural disasters

Natural disasters such as tornadoes, landslides, floods, and earthquakes also destroy the habitat of animals and plants.

Global warming

The emission of gases such as carbon dioxide creates a layer of trapped heat in the atmosphere. This causes Earth's temperature to rise. The continued increase in the temperature causes ice in the North and South Poles to melt and thus, raising the sea level. As the coasts are submerged, the coastal animals and plants lose their habitats.



Every year, the ice in the North Pole gradually melts due to global warming.

The sea level rises and destroys the habitat of plants and animals.

Describe all the factors that cause the threat of extinction to animals and plants.

Preservation of Animals and Plants

Preservation of animals and plants is necessary to protect them from extinction. What does preservation mean?

Preservation means keeping animals and plants in their original and balanced state.

How are the methods of preservation implemented?

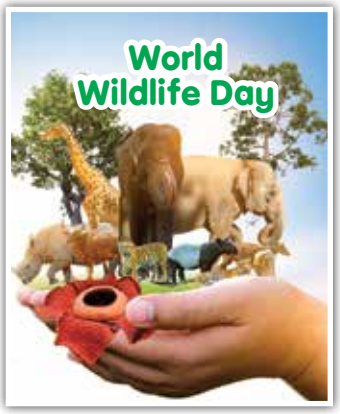
Selective logging

Selective logging is carried out to reduce its impact to the environment. This method also protects the habitat of animals and plants.

before selective logging **after selective logging**

Educate the public

The public is educated on the importance of protecting animals and plants from the threat of extinction.



World Wildlife Day Campaign

5.1.1, 5.1.2

Boycott products made from endangered species

Consumers and buyers should make wise decisions by not purchasing products made from endangered animals and plants.

turtle eggs

pitcher plants

Enforcement of laws

Laws are strictly enforced to protect animals from the threat of extinction.
In Malaysia, animals such as the Malaysian tigers, Malayan tapirs, orangutans, elephants, turtles, and tree shrews are protected by the law.

Malayan tiger

Malayan tapir

tree shrew

Reduce, reuse, recycle

Reusing and recycling goods are practised in order to help prevent further exploitations of animals and plants.

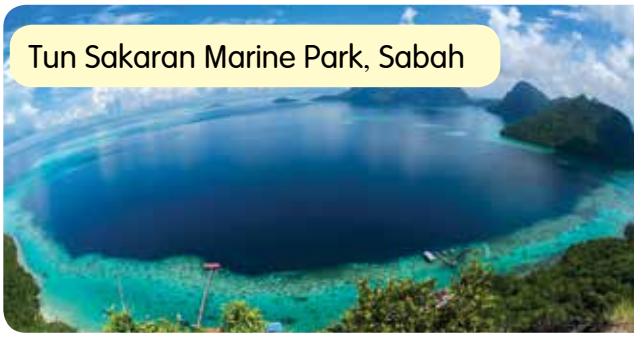
Reducing, reusing, and recycling plastic can help reduce pollution.

Reducing, reusing, and recycling paper can help reduce logging activities.

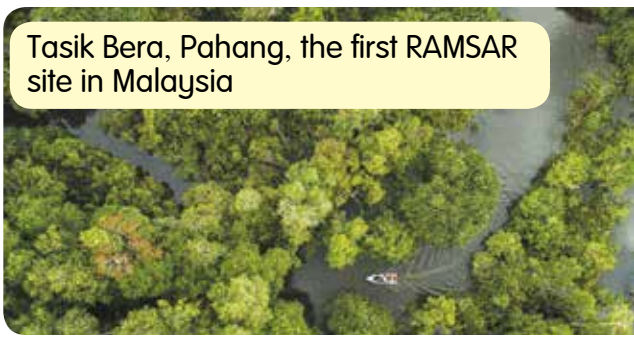
Gazette forest reserves and marine parks as protected areas

Forest reserves such as the National Forest Reserve, marine parks, and RAMSAR sites are protected by the law and those caught violating the law would be given severe punishment.

National Park, Pahang



Tun Sakaran Marine Park, Sabah



Tasik Bera, Pahang, the first RAMSAR site in Malaysia

SCIENCE INFO

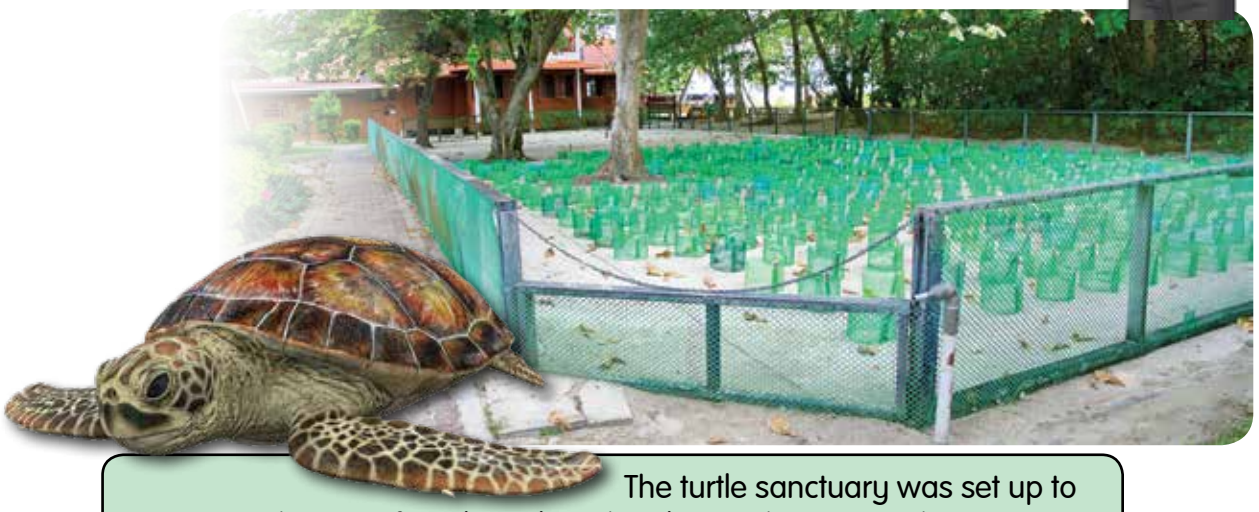
RAMSAR site is a wetland area that is designated under the Convention on Wetland that took place in Ramsar, Iran in 1971. The convention provides the framework for preserving and conserving the wetlands from further destruction.

Conservation of Animals and Plants

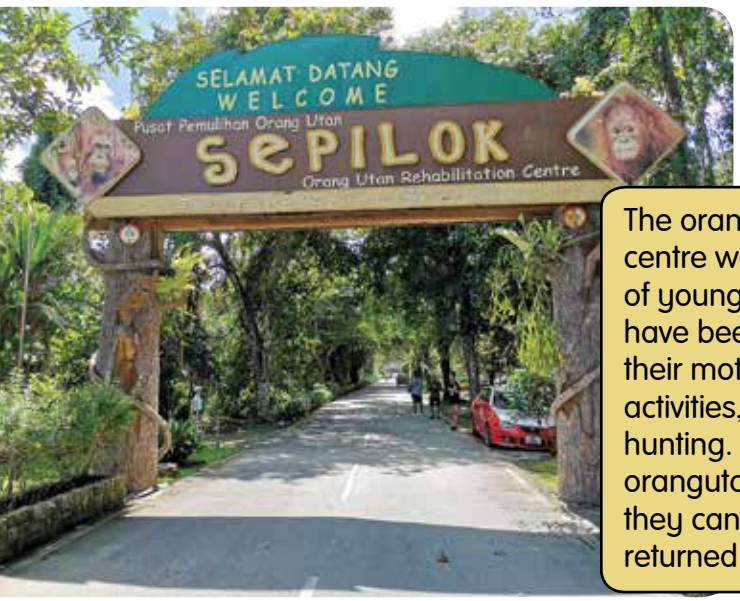
What is conservation? Conservation means returning animals and plants to their natural conditions.

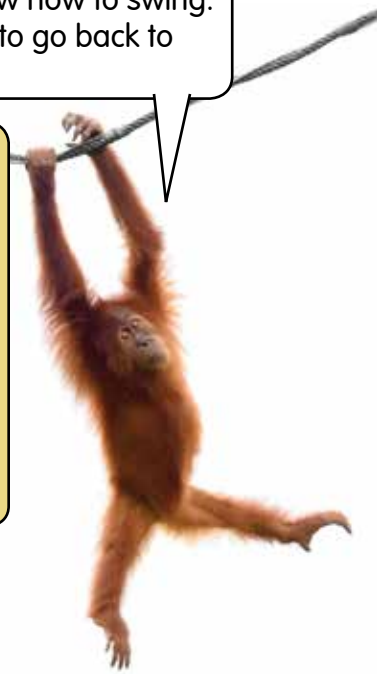
Setting up conservation centres

Conservation centres such as the turtle sanctuary and orangutan rehabilitation centre help ensure these animals have a higher chance of living in their natural habitats.



The turtle sanctuary was set up to monitor and protect female turtles when laying their eggs. This increases the hatching and survival rate of baby turtles.





The orangutan rehabilitation centre was set up to take care of young orangutans that have been separated from their mothers due to logging activities, agriculture or illegal hunting. At the centre, young orangutans are trained so that they can survive when they are returned to their natural habitat.

Pangolins are one of the endangered animals in Malaysia. According to some people, the pangolin scales, meat, and skin are believed to have medicinal properties. Suggest ways of preservation and conservation to overcome this situation.

Replanting

Replanting is carried out to replace damaged forests where logging activities have taken place. Seeds or seedlings are planted in the cleared area.

reforestation

replanting in a mangrove swamp

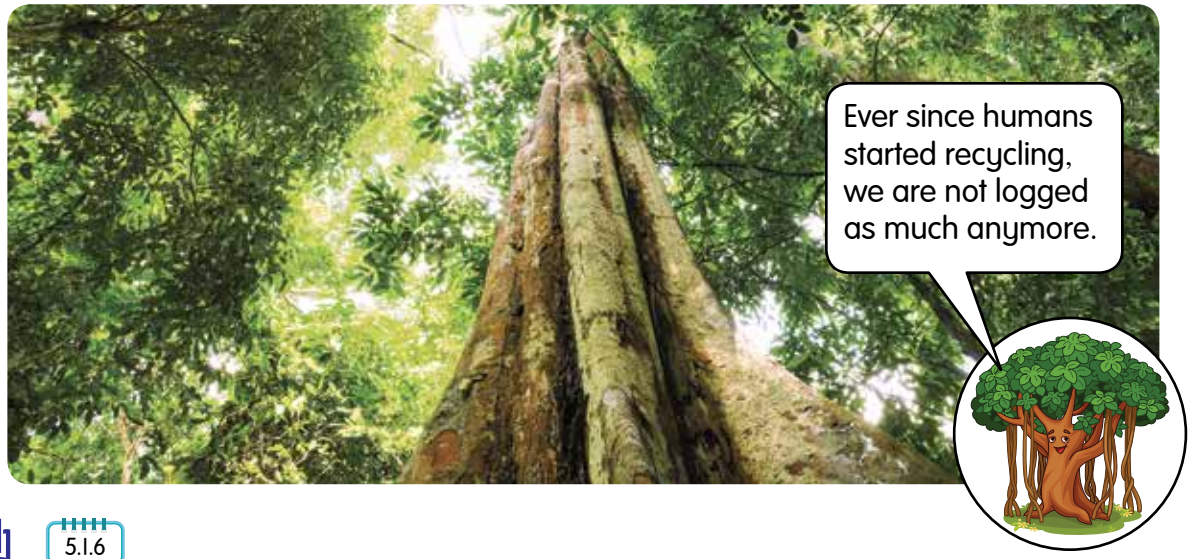
The Importance of Preservation and Conservation

Preventing extinction

Preservation and conservation help reduce the factors that threaten the animals and plants, as well as increasing their population.

Ensuring animals and plants are not overexploited

Reusing, reducing, and recycling reduce the dependence on natural resources. These activities help to protect animals and plants from overexploitation.



Maintaining a clean and healthy environment

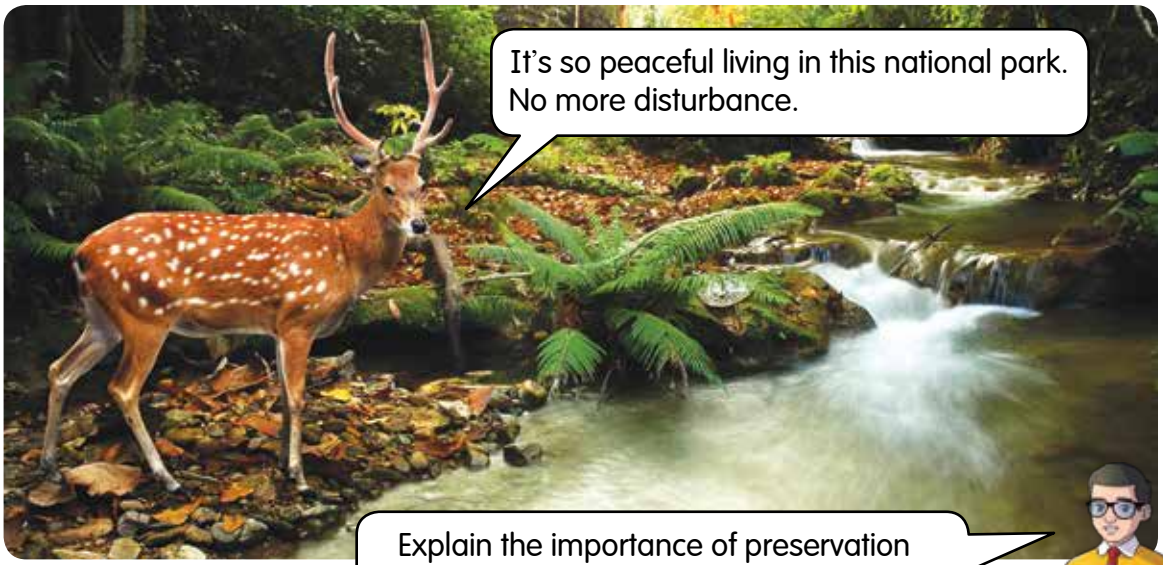
Controlled logging such as selective logging and replanting activities help maintain the oxygen-carbon dioxide balance.

Preventing loss of habitat

Designated sites such as forest reserves, marine parks, and RAMSAR sites help prevent animals and plants from losing their habitats.

SCIENCE INFO

Plants only provide a small amount of oxygen to humans. The biggest producers of oxygen on Earth are the algae that live in deep oceans.



FUN ACTIVITY

Threat of Extinction to Animals and Plants Visual Exhibition

Apparatus and materials: glass jars, animal and plant models, small-sized waste materials, marker pen, adhesive tape, cooking oil

Group Activity

21st Century Learning Skills

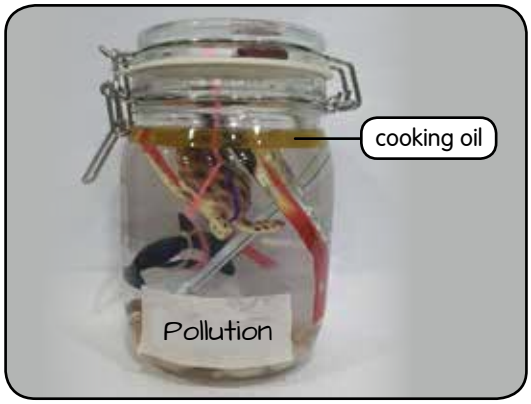
Steps:

1. 

Gather several glass jars. Label each glass jar with a factor that causes the threat of extinction to animals and plants. For example, label "Pollution" on one of the glass jars.

2. 

Insert a few animal models such as a fish and a turtle. Then, fill the glass jar with water until it is full.

3. 

Creatively, place a few small-sized waste materials to represent pollutants such as plastic food wrappers, plastic straws, and cooking oil.

5.1.2, 5.1.5, 5.1.7

4.

Other groups will produce other visual exhibits to describe different factors that cause the threat of extinction to animals and plants.

5. Exhibit the work of your group at one corner of the class. Explain the threat factor of your glass jar and suggest suitable preservation and conservation methods to your friends.

Questions:

1. What are the factors that cause the threat of extinction to animals and plants?
2. Explain ways of preservation and conservation of animals and plants with examples.
3. How do you help preserve and conserve the environment to make it more sustainable?

A sustainable environment is our responsibility to maintain. The natural resources and the global ecosystem must be protected so that there will be enough resources for the present and future generations.

FUN SCIENCE

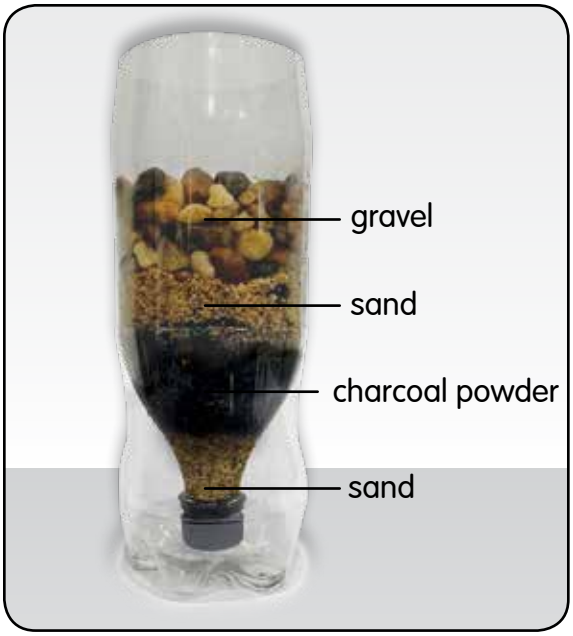
Water Filter Challenge

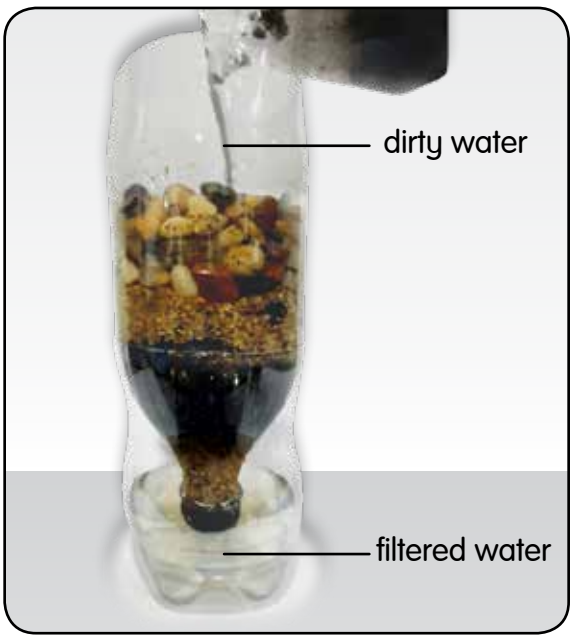
In groups, make a water filter using a plastic bottle, cup, scissors, nail, hammer, stopwatch, and objects such as gravel, sand, and charcoal powder.

Steps:

1. Form a group of two to three pupils. Check and determine the materials that will be used as the filtering materials. You may cut the materials into smaller sizes.
2. Cut the bottom part of a plastic bottle.
3. Make a hole on the bottle cap using a nail. Screw the cap back onto the bottle.
4. Put the filtering materials in layers. The water filter should consist of at least three filtering materials.
5. Pour a cup of dirty water into the plastic bottle. The water filter should be able to filter the dirty water in less than a minute. Share your water filter with the other groups.

Be careful when using sharp tools.





The filtered water is still not safe for drinking.

MIND REFLECTION

1. Some of the extinct animals are the dodo birds, mammoths, Tasmanian wolves, dinosaurs, quaggas, and sabre-toothed tigers.

2. The endangered animals and plants are as follows:

Endangered animal	Endangered plant
elephant, rhinoceros, orangutan, panda, Malayan tapir, Malayan tiger	*meranti* tree, *keruing* tree, *cengal* tree, Rafflesia, pitcher plant, slipper orchid, *tongkat ali* plant

3. Factors that cause the threat of extinction to animals and plants are destruction of habitat, illegal hunting, pollution, natural disasters, and global warming.

4. Ways of preservation and conservation of animals and plants are as follows:

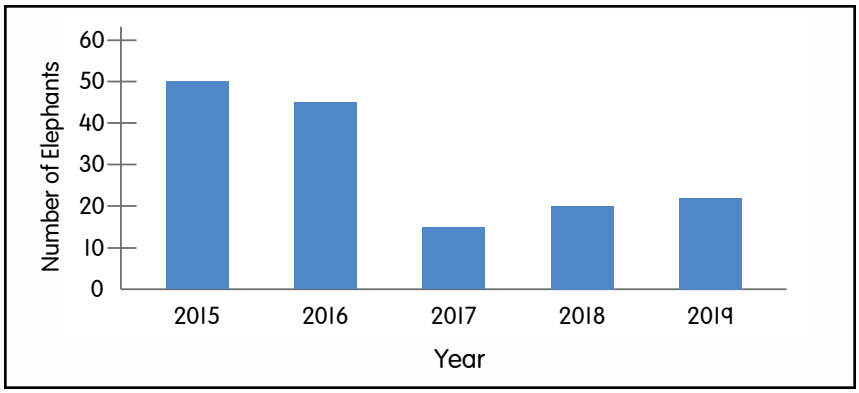
Preservation	Conservation
• selective logging • educate the public • boycott products made from endangered species • enforcement of laws • reduce, reuse, recycle • gazette forest reserves and marine parks	• setting up conservation centres • replanting

5. The importance of preservation and conservation are as follows:
   - preventing extinction
   - ensuring animals and plants are not overexploited
   - maintaining a clean and healthy environment
   - preventing loss of habitat

MIND TEST

1. State the meaning of preservation and conservation of animals and plants.

2. The information below shows the number of elephants in forest X recorded from 2015 to 2019.



Based on the bar chart above, answer the questions below.

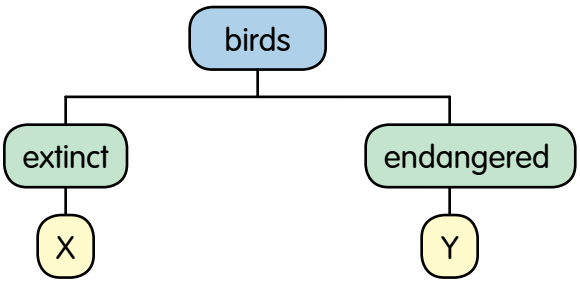
(a) State your observation.

(b) State an inference on the numbers of elephants for the following years.

(i) from 2015 to 2017
(ii) from 2017 to 2019

(c) Suggest two ways to prevent elephants from facing extinction.

3. The diagram below shows the classification table of birds.



(a) Name the bird:

X: _____ Y: _____

(b) Can the conditions of bird X be improved? Explain.

(c) Suggest three suitable ways to conserve bird Y.