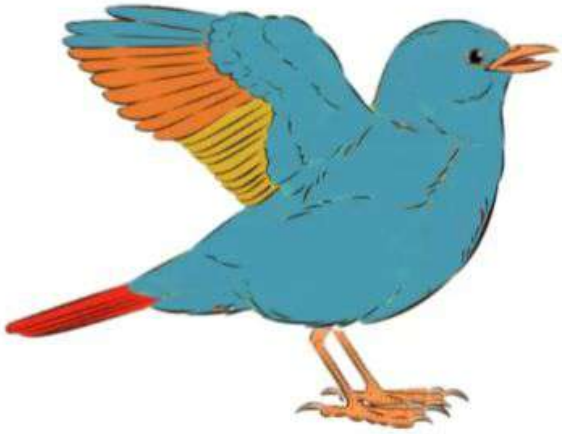
Science

Pupil's Book

Standard Three



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Introduction

The Science textbook has been prepared in line with the 2023 Science Syllabus for Primary Schools Standard III–VI issued by the Ministry of Education, Science and Technology. Some contents in this book have been lifted from the earlier books for Science and Technology of Standards Three, Four and Five published in 2018 and Standard Seven published in 2021, in accordance with the curriculum and syllabus of 2016. This textbook has five chapters namely: The concept of science, Sense organs, Living and non-living things, Scientific investigation and Simple ICT games.

The contents in this book have been presented through text, learning activities, exercises and illustrations. Furthermore, each chapter has activities, questions and exercises to enable you assess your understanding of the respective contents. Moreover, you are advised to consult your teachers, parents or guardians when searching for information from the library, internet and other sources.

Additional learning resources are available in the TIE e-Library at *https://ol.tie.go.tz* or *ol.tie.go.tz*

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Chapter One

The concept of science

Introduction

Science involves investigation and experimentation. In this chapter, you will learn about the meaning of science, branches of science and the importance of science. The competencies developed will enable you to value the importance of science in our everyday life. You will also develop investigative skills on various things in our environment. Moreover, you will develop basic problem-skills that will help you solve issues scientifically.

Think

Importance of science in daily life

Meaning of science

Science is a body of knowledge which involves investigations and experimentation. It involves observation, experimentation or investigation of various phenomena. Experiments can involve measurement of various parameters such as temperature, length and mass.

Science is used to explain how things work in the real world; for example, rain formation, occurrence of earthquake and thunderstorm. Science helps to make tools and machines that are used to simplify work or solve problems in our daily life. See Figure 1. A person who does scientific work is called a scientist.

(a)

(b)

Figure 1: *Using scientific tools*

Activity 1

Observe Figure 2, then write what you see.

(a)

(b)

(c)

(d)

Figure 2: *Applications of science in different activities*

Figure 2 shows a pupil pushing a heavy stone using an iron rod. The figure also shows a pupil using a mobile phone to simplify communication. We can also apply science when we play; for example, sliding and swinging. Therefore, scientific knowledge is used in making various tools used in our life.

Exercise 1

1. Mention three (3) activities that apply science in daily life.

2. Observe pictures (a)–(d) and write the type of scientific activity shown in each picture.

Picture	Type of science-related activity
 (a)	
 (b)	
 (c)	
 (d)	

Branches of science

Activity 2

Use library or online sources to explore the branches of science.

There are different branches of science. These include Biology, Physics and Chemistry. See Figure 3. Each branch deals with a specific body of knowledge.

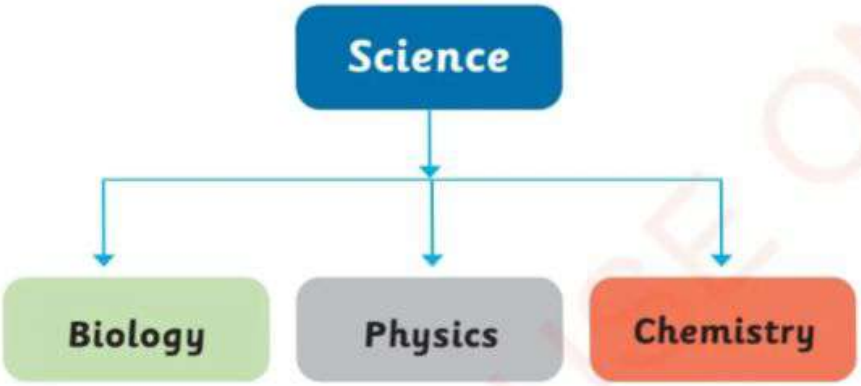


Figure 3: *Branches of science*

Biology is a branch of science that deals with living things. Living things include plants and animals. See Figure 4.

Figure 4: *Living things*

Physics is a branch of science that deals with matter in relation to energy. The forms of energy include heat, light and electric energy. There are different sources of energy. The primary source of energy is the sun. Figure 5 shows a solar panel which is used to produce energy from the sun. It is called solar energy.

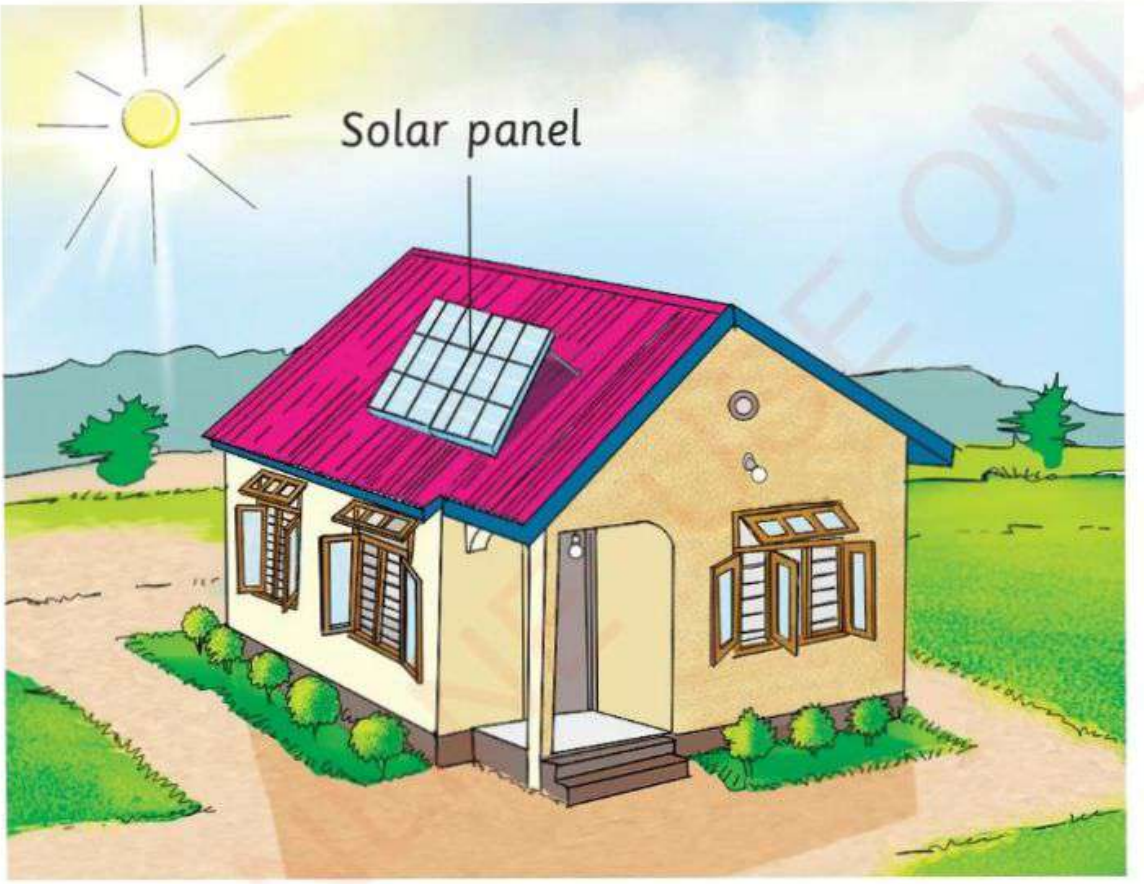


Figure 5: *Solar panel on the roof of a house*

Chemistry is a branch of science that deals with composition and properties of matter. It also deals with how matter changes. Matter exists in different states including solid, liquid and gaseous state.

Examples of solids include stone and sugar. Examples of liquids include water and milk. Examples of matter in gaseous state include air, oxygen gas and carbon dioxide gas. See Figure 6.

Solid

Stone

Liquid

Water in a jug

Gas

Balloon filled with air

Figure 6: *Three states of matter*

Exercise 2

Write **TRUE** for a correct sentence and **FALSE** for an incorrect sentence.

1. Chemistry is a branch of science that deals with matter in relation to energy.
2. Physics deals with the characteristics of living things.
3. Biology deals with animals and plants.
4. Chemistry deals with the study of properties of matter.

The importance of science

Science is important to human beings in different ways. Scientific discoveries have enabled human beings to adapt to their environment. The importance of science in everyday life includes the following:

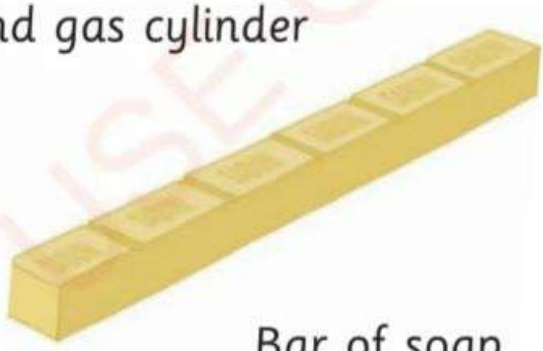
(a) It helps to generate new knowledge and skills. These skills include creativity, inquiry and critical thinking.

(b) It helps to make different instruments or equipment used in our daily life. For example:

(i) Items and equipment we use at home, such as clothes, soap, toothpaste, cooking gas, gas cylinders, table, food utensils, television, fridge, radio and car. Look at Figure 7.

Table, gas cooker and gas cylinder

Toothpaste

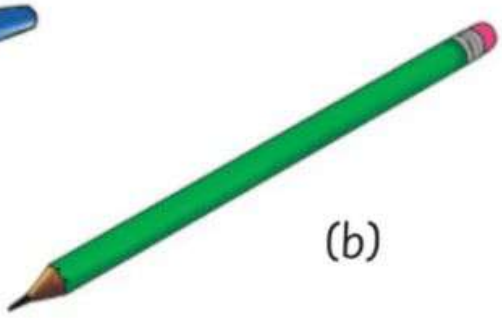


Bar of soap

Figure 7: *Items used at home*

(ii) Various items used in schools, such as chalks, exercise books, pens and books. See Figure 8.

(a)



(b)

Figure 8: *Pen and pencil*

(iii) Building materials such as cement, lime, iron sheets, pipes, steel and tiles. These are used for building infrastructure such as houses and bridges. See Figure 9.

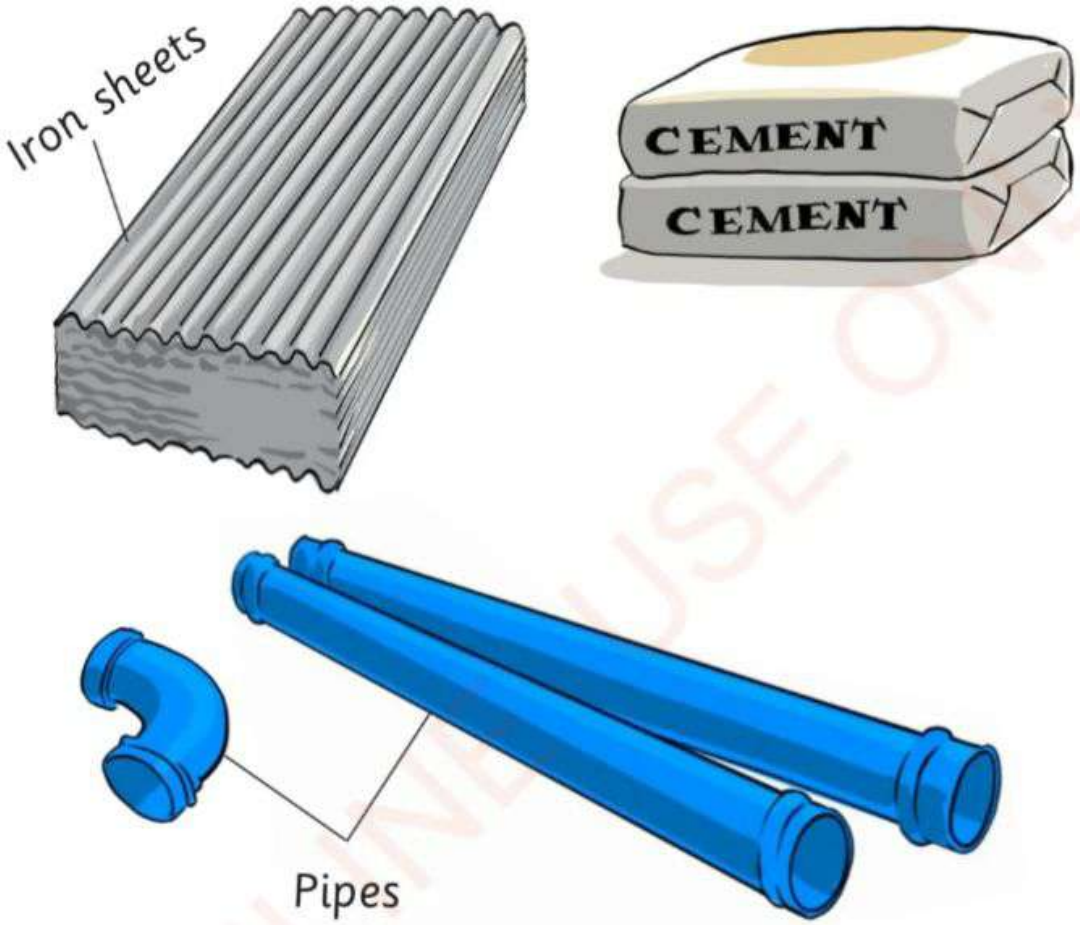


Figure 9: *Building materials*

(iv) Equipment for investigation and diagnosis of diseases. An example of such equipment is a microscope as indicated in Figure 10.

Figure 10: *Laboratory technician using a microscope*

(v) Devices such as telephone and computers used to simplify communications. See Figure 11. These devices are connected through networks to enable communications.

Figure 11: *Child using a telephone to communicate*

Careers in Science

There are different careers in science. Among the careers in science are teaching, pharmacy, engineering, veterinary medicine, medicine, civil aviation, chemistry and botany.

The following table shows description each scientific career.

Table: Descriptions of scientific careers

No.	Careers	Descriptions of careers
1.	Medicine	Medicine deals with diagnosis of diseases and treatment of people. The person who is specialised in this career is called a medical doctor.
2.	Teaching	Teaching deals with guiding learners to get scientific knowledge. The person who is specialised in this career is called a science teacher.
3.	Pharmacy	Pharmacy deals with preparing, dispensing and management of drugs. The person who is specialised in this career is called a pharmacist.
4.	Engineering	Engineering deals with designing and construction of structures such as bridges and buildings. The person who is specialised in this career is called an engineer.
5.	Chemistry	Chemistry deals with chemical research or experiments. The person who is specialised in chemistry called a chemist.

No.	Careers	Descriptions of careers
6.	Botany	Botany deals with plants. The person who deals with the scientific study of plants is called a botanist.
7.	Veterinary medicine	Veterinary deals with disease diagnosis and treatment of animals. The person who deals with this career is called a veterinarian.

Some of scientific careers are shown in Figure 12.

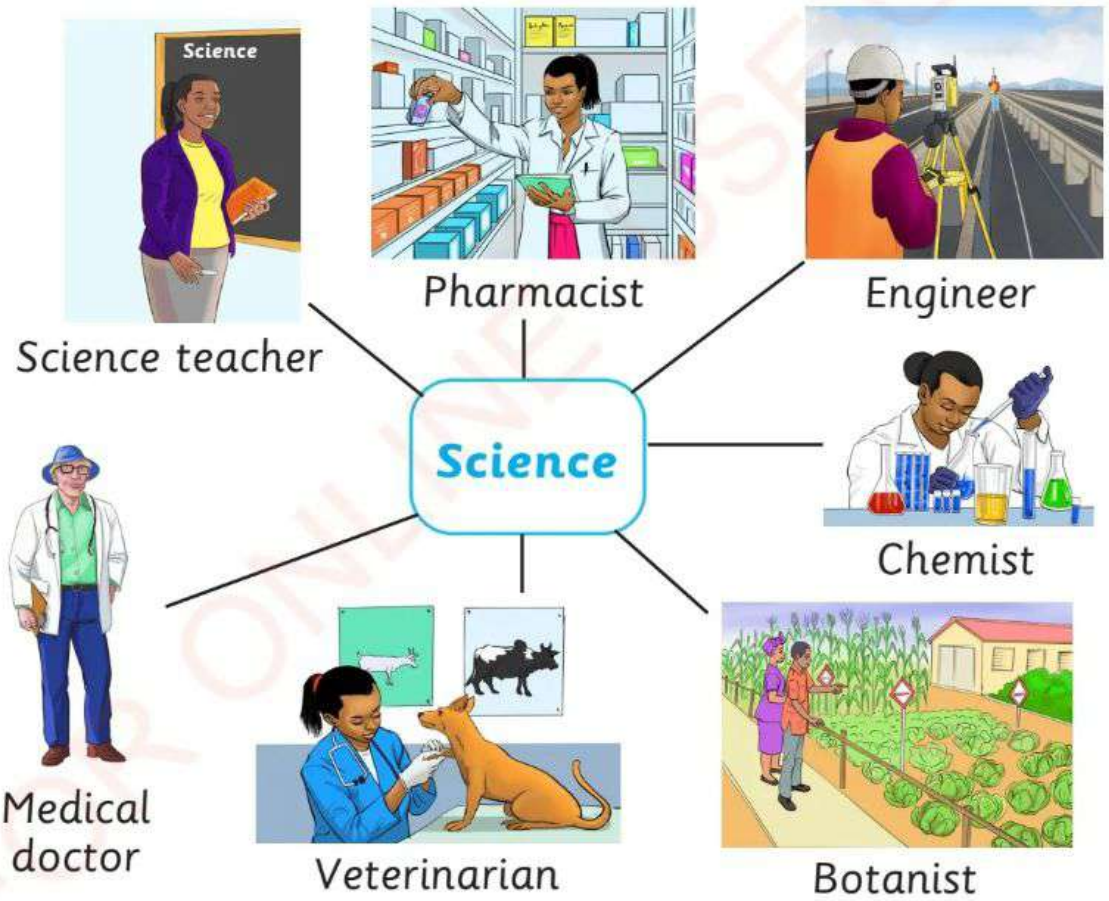


Figure 12: *Science professionals*

Revision exercise

1. Match the sentence in **List A** with the correct word from **List B**.

List A	List B
(a) A scientist who studies chemistry	(i) Medical doctor
(b) A scientist who deals with plants	(ii) Veterinarian
(c) A scientist who diagnoses and treats people in hospitals	(iii) Botanist
(d) A scientist who deals with animals	(iv) Chemist
(e) A scientist who deals with designing and construction of structures such as bridges and buildings	(v) Pharmacist
(f) A scientist who prepares, dispenses and manages drugs	(vi) Engineer

2. Fill in the blanks in the following sentences.
   (a) Science that deals with matter in relation to energy is called _____.
   (b) Science that deals with the matter and its properties is called _____.

(c) Science that deals with plants and animals in their environment is called _____.

3. Explain how science is used in the following areas:
   (a) At home
   (b) At school
   (c) In shops
   (d) In hospitals
   (e) On the road

4. Name science professions other than those explained in this chapter.

Vocabulary

Air	mixture of different gases
Energy	ability to do work
Investigation	a way of finding out information of unknown matter using various methods
Laboratory	room or building for scientific experiments or research
Matter	anything that has weight and occupies space
Microscope	an instrument used for viewing very small things which can not be seen by naked eyes

Chapter Two

Sense organs

Introduction

Sense organs are special organs which help the body to detect and recognise stimuli in the environment and respond to them. In this chapter, you will learn about the meaning and functions of human sense organs. In addition, you will use sense organs to detect different things found in the environment. The competencies developed will enable you to take care of the organs and use them properly.

Think

The way human beings respond to stimuli in their environment

Meaning of sense organs

There are different stimuli in our environment. A stimulus is anything that can make an organism respond to it. A human being uses five sense organs to detect and recognise different stimuli in the environment. These

organs are the ear, eye, nose, skin and tongue. See Figure 1. The sense organs receive the stimuli from the environment and send the information to the brain for interpretation.

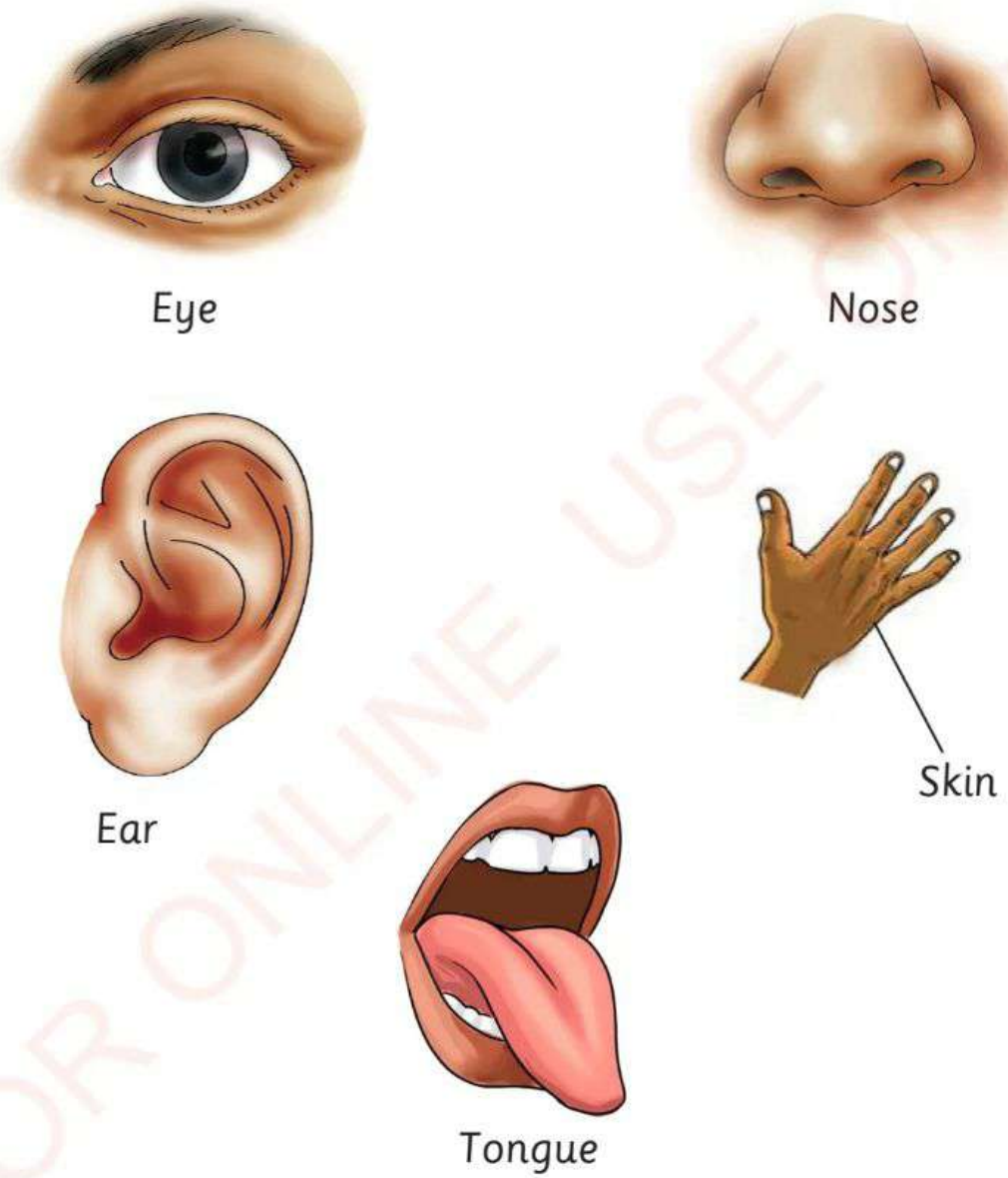


Figure 1: *Human sense organs*

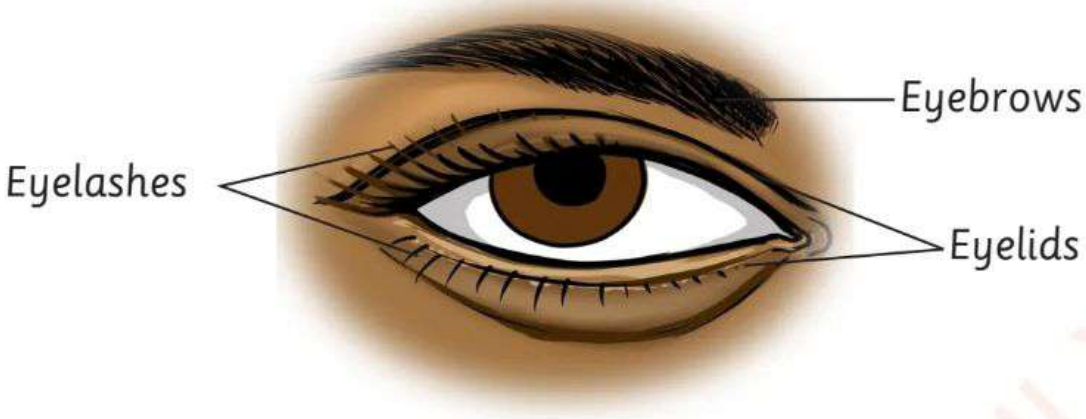


Figure 3: *Outer parts of the human eye*

The inner part includes the pupil, iris, lens and retina. See Figure 4. An eye is an organ that receives light through the pupil. The amount of light that enters the eye is controlled by the iris. The retina of the eye changes light into signals. The brain interprets the signals into the actual images we see.

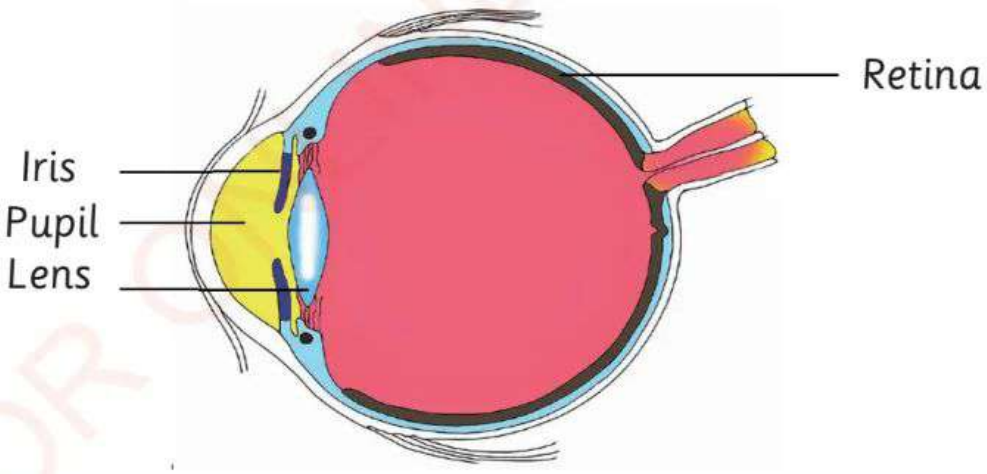


Figure 4: *Internal parts of the human eye*

Parts of the eye and their functions

Parts of the eye perform various functions to enable proper vision. The parts of the eye and their functions are explained in Table 1.

Table 1: Parts of the eye and their functions

Main parts	Parts	Function
External part	Eyebrows	Prevent sweat, dust and other objects from entering the eye.
	Eyelids	Cover the eye to prevent objects from entering it.
	Eyelashes	Prevent dust from entering the eye.
Internal part	Pupil	Allows light to enter the eye
	Iris	Regulates the amount of light that enters the eye.
	Retina	Contains cells that are sensitive to light and enables the image to be formed.
	Lens	Focus light into the retina.

Activity 2

1. Use library or online sources to explore how the eye is cared and protected.
2. Explain how you take care of your eyes.

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Activity 2

1. Use library or online sources to explore how the eye is cared and protected.
2. Explain how you take care of your eyes.

Caring for the eyes

Eyes must be cared to keep them healthy and for proper vision. The eyes are cared by:

(a) Not wearing glasses without advice from an optician;

(b) Reading under enough light;

(c) Cleaning your eyes regularly with clean water; and

(d) Not rubbing or cleaning your eyes with dirty hands or materials.

Activity 3

Observe shapes (a) to (e) in Figure 5 and name the colour of each shape.

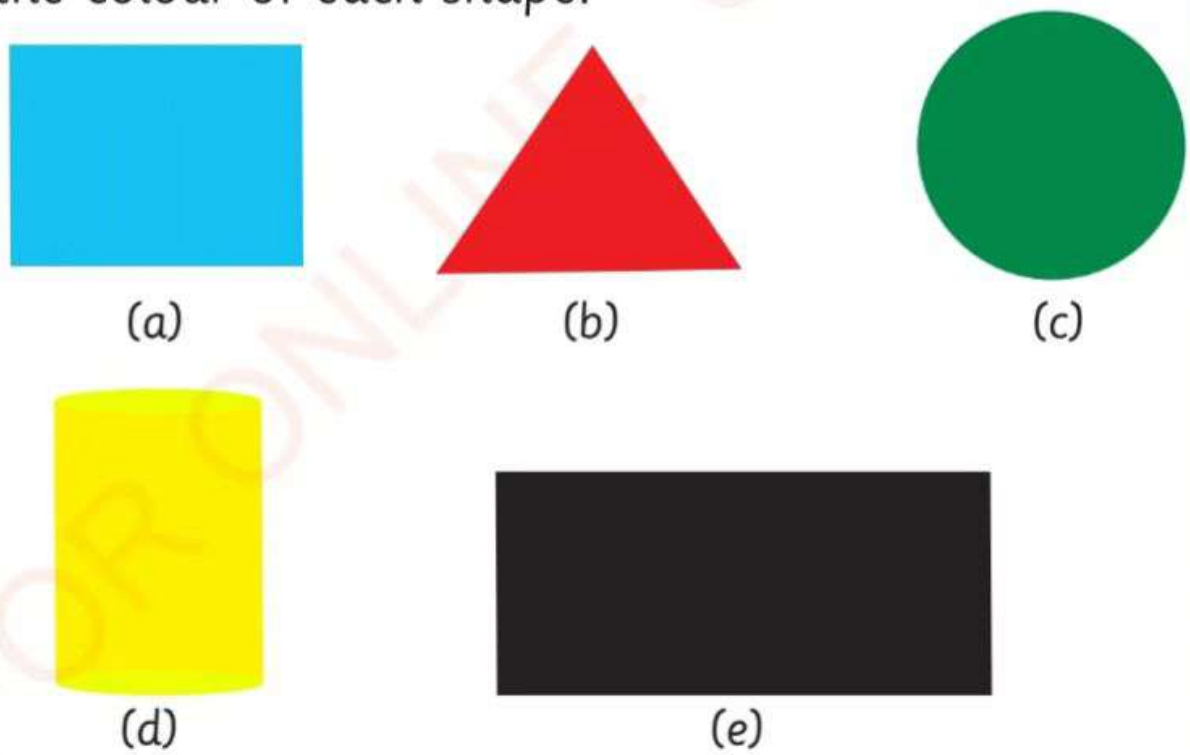


Figure 5: *Shapes with different colours*

Tongue

The tongue is a sense organ that is used for recognising tastes of different substances. The tongue has taste buds which can recognise five different tastes, namely sweet, sour, salty, umami and bitter. See Figure 6. The information on taste is then sent to the brain for interpretation.

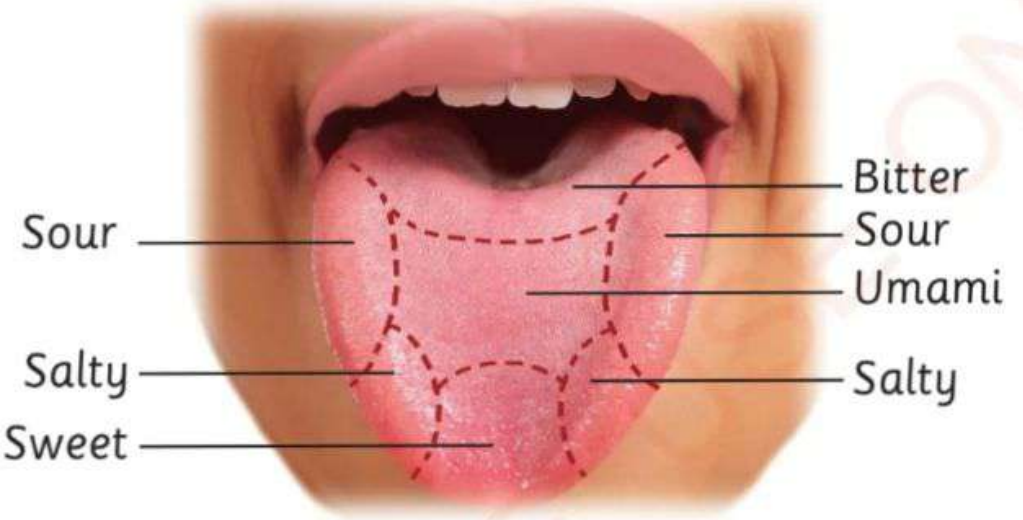


Figure 6: *Taste areas of the tongue*

Parts of the tongue and their functions

Each taste is detected mostly at a specific part of the tongue, as shown in Table 2.

Table 2: Parts of the tongue and their functions

No.	Part of the tongue	Function
1.	The tip of the tongue	To detect sweet taste
2.	The two front sides of the tongue	To detect salty taste
3.	The middle part of the tongue	To detect umami taste
4.	The back sides of the tongue	To detect sour taste
5.	The back of the tongue	To detect bitter taste

Activity 4

Recognising taste of substances

Materials: Lemon, sweets, ripe bananas, oranges, lemon peel, coffee, salt and tomatoes, lemon seeds and watermelon

Procedure

1. Collect and arange in groups the substances as shown in Table 3.

Table 3: *Types of substances and their tastes*

Group	Type of substances	Taste	
A	(i) Lemon (ii) Tomato	(i) Sour	(ii) Umami
B	(i) Orange (ii) Sweets		
C	(i) Ripe banana (ii) Coffee		
D	(i) Lemon seeds (ii) Orange		
E	(i) Tomato (ii) Watermelon		
F	(i) Lemon (ii) Coffee		
G	(i) Lemon peel (ii) Salt		

2. *In each group, choose one substance after another for tasting.*
3. *Write the identified taste in your own prepared table, similar to Table 3.*

Question

Which substances were having similar taste?

Caring for the tongue

The tongue is cared by:

(a) Cleaning your mouth and tongue regularly.

(b) Avoiding very hot or cold foods to protect the taste buds of your tongue;

(c) Not tasting substances that you do not know because some of them may be poisonous; and

(d) Not piercing your tongue.

The nose

The nose is the sense organ for smelling. It protrudes from the front part of the face and has two holes called nostrils, which are separated by cartilage. See Figure 7. The main function of the nose is to smell different substances. Another function of the nose is to allow air into and out of the lungs during breathing. The information on smell is sent to the brain for interpretation.

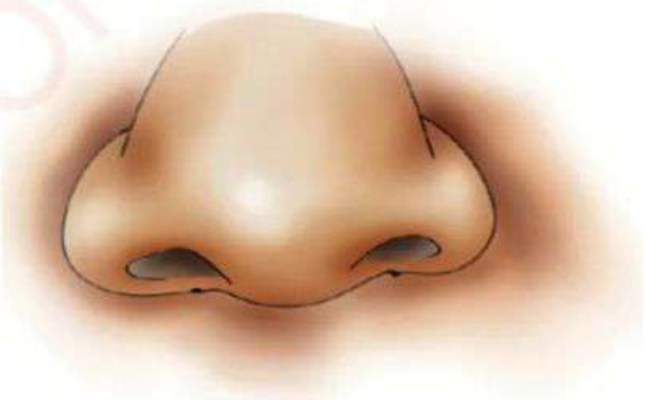


Figure 7: *Nose*

Caring for the nose

The nose is cared by:

(a) Cleaning your nose using clean water; and

(b) Not inserting objects into your nose.

The skin

The skin is a sense organ that covers the whole body of animals, including human beings. Its function is to feel or sense different conditions, such as heat, cold, touch, texture, pressure, pain and vibrations. The skin has three major layers which are upper layer or epidermis, middle layer or dermis and inner layer or fat layer. The skin consists of other components such as hair. See Figure 8. The skin receives signals and sends information to the brain for interpretation.

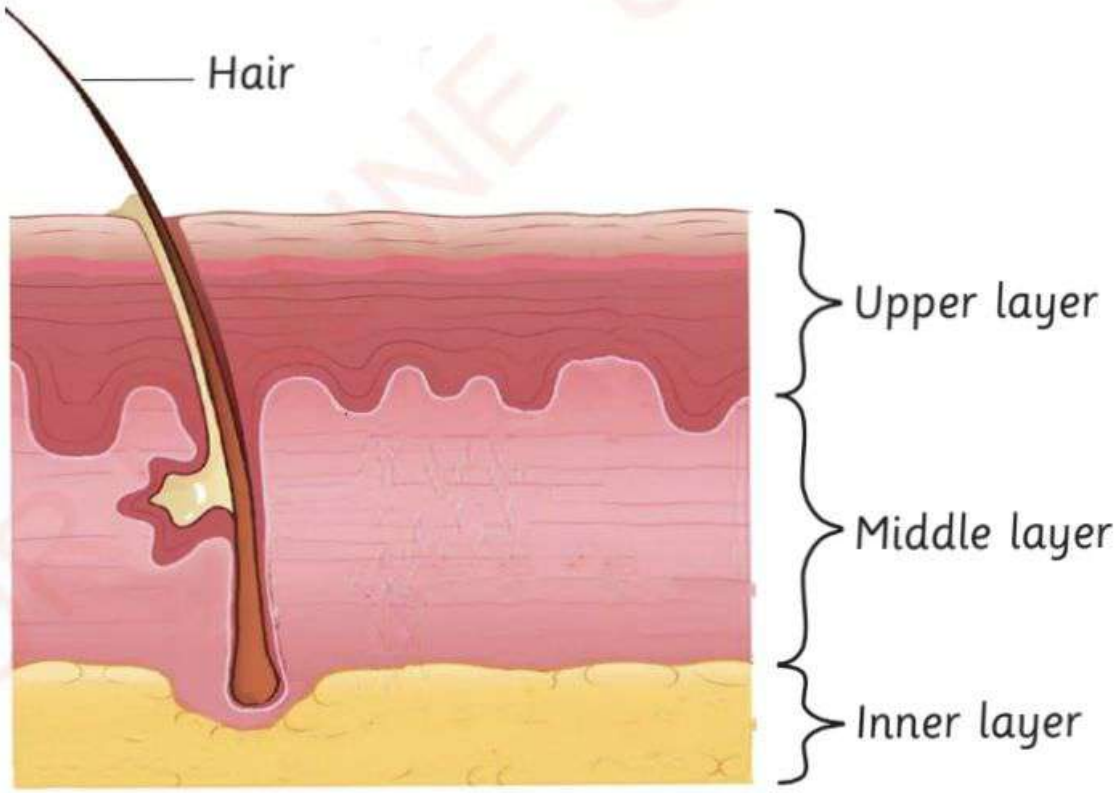


Figure 8: *Parts of the skin*

Activity 5

Collect materials shown in Figure 9 and touch each of the materials to feel its texture.

(a) Coconut

(b) Cotton wool

(c) Pineapple

(d) Orange

Figure 9: *Materials with different textures*

Caring for the skin

The skin is cared by:

(a) Keeping it clean by taking bath regularly;

(b) Using clean water, sponge or brush and soap when bathing;

(c) Drying your body with a clean towel after bath;

(d) Applying appropriate body oil or jelly after bath; and
(e) Eating nutritious food and drinking enough water.

The ear

The ear is an organ used for hearing. It can recognise different sounds. The ear consists of three major parts, namely outer ear, middle ear and inner ear, as shown in Figure 10.

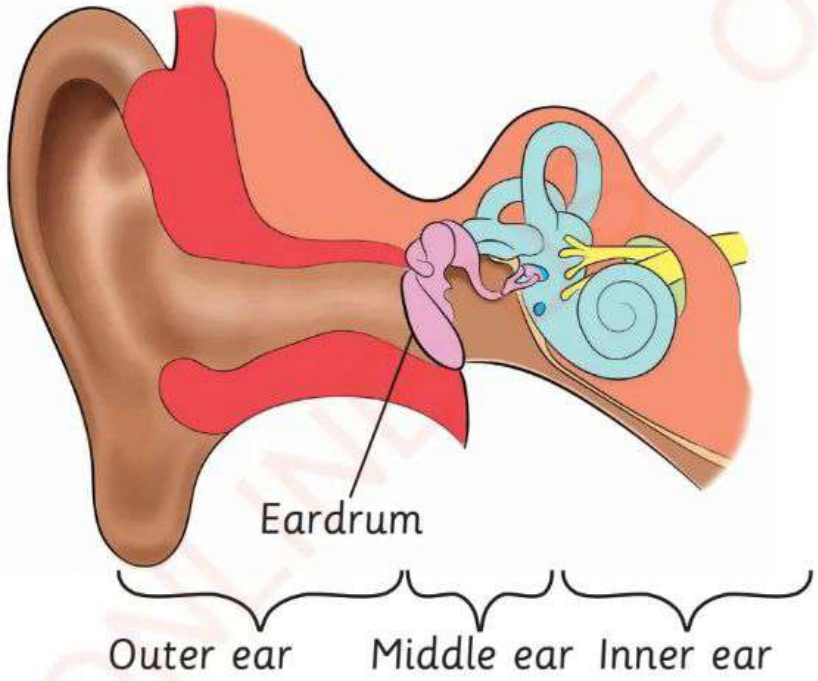


Figure 10: *Parts on an ear*

Recognising sounds

The outer ear collects sound waves and directs them into the middle ear through the eardrum. The middle ear receives sound waves from eardrum and passes them to the inner ear. The inner ear passes the sound waves to the brain where the sound is interpreted.

Caring for the ears

It is important to care and protect ears from injuries and diseases which may affect them and the hearing process. The ears are cared by:

(a) Avoiding loud sound when using a radio or television;

(b) Not inserting sharp objects into your ear, as they may damage the eardrum;

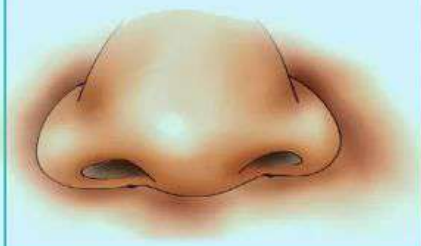
(c) Ensuring that water does not enter into the ear when bathing or swimming;

(d) Not removing the ear wax. The wax prevents things like dust to enter into the ear; and

(e) Attending the ear clinics regularly for check-up.

Exercise

1. What sense organ will you use to detect or recognise the following?
   (a) Smell of a flower
   (b) Colour of an orange
   (c) Cock crowing sound
   (d) Soil texture
   (e) Taste of grape juice
2. Match the picture of sense organs with their respective functions.

Number	Picture	Functions
(a)		(i) Detecting colour of different flowers in the garden
(b)		(ii) Hearing a song about environmental protection
(c)		(iii) Tasting a bitter medicine
(d)		(iv) Detecting the smell of a burning material

3. Name two examples of food substances having each of the tastes provided in the following table.

Number	Taste	Food
(a)	Sweet	Honey, sugar
(b)	Umami	
(c)	Sour	
(d)	Bitter	
(e)	Salty	

The importance of sense organs

Sense organs are very important in the human body. Sense organs help us to detect or recognise changes in our environment and respond accordingly. Any damage to our sense organs affects the ability to receive or detect the stimuli from the environment. For example, defects in the ears can cause deafness and defects in the eyes can cause blindness.

Activity 6

To identify things in the environment using sense organs

Materials: Pencil and exercise book

Walk around your home or school compound and

use your sense organs to detect or recognise the following:

(a) Weather condition
(b) Number of buildings
(c) Sounds of objects
(d) Smells of different things in the environment

Revision exercise

Section A: Choose the correct answer.

1. When Rama got up in the morning, he found it was dark and cold. Which sense organs did he use?
   (a) Eyes and skin
   (b) Ears and eyes
   (c) Skin and nose
   (d) Nose and ears

2. A pupil ate a ripe banana and said that it was sweet. Which of the following parts of the tongue was responsible for detecting the sweet taste?
   (a) Middle part of the tongue
   (b) Side parts of the tongue
   (c) Tip of the tongue
   (d) Side and middle parts of the tongue

3. Which of the following is correct about sense organs?
   (a) Ears are used for hearing.
   (b) Eyes are used for smelling.

(c) Nose is used for tasting.
(d) Tongue is used for feeling.

4. How many sense organs do human beings have?
   (a) Three
   (b) Six
   (c) Five
   (d) Four

5. The sense organ that can be used to detect the green colour of spinach is:
   (a) an eye
   (b) a nose
   (c) a skin
   (d) an ear

6. Which of the following represents a group of sense organs?
   (a) Nose, legs, ears, skin and tongue
   (b) Tongue, ears, skin, nose and mouth
   (c) Ears, skin, hands, nose and tongue
   (d) Eyes, ears, skin, nose and tongue

Section B: Write **TRUE** for a correct sentence and **FALSE** for an incorrect sentence.

7. The skin is a sense organ which is sensitive to heat and cold.

8. The tongue is used for smelling only.

9. The tongue cannot detect the taste of lemon juice.
10. The defects to the ears causes a person to lose the ability to see.
11. The sense organ used for seeing is an eye.

Vocabulary

Organ part of the body which performs a specific function. Example of organs are ears, nose, tongue, eyes and skin

Taste buds special cells in the tongue with nerves that collect information about the taste of food

Umami a combination of tastes which are found in foods such as meat, milk and fish

Chapter Three

Living and non-living things

Introduction

In our environment, we are surrounded by various living and non-living things. In this chapter, you will identify living and non-living things. You will learn about the characteristics of living things and the main groups of living things. You will also learn how living things depend on each other. Moreover, you will learn how to take care of living things. The competencies developed will enable you to value and conserve living things and their environment.

Think

Living and non-living things in your environment

Living and non-living things in the environment

The environment is composed of living and non-living things. Living things are the things that have life. Living things are also known as organisms. Examples of living things are plants and animals. Non-living things are

things that have no life. Examples of non-living things are a stone, a car, a mountain and house.

Activity 1

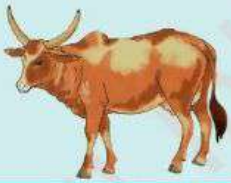
(a) Observe Figure 1, then mention the things that you see.

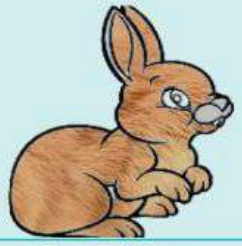
(b) Use different sources of information, including library and online sources to explore various living and non-living things.

Figure 1: *Living and non-living things in the environment*

Exercise 1

Indicate living and non-living things by putting a tick (✓) in the appropriate column.

No.	Living and Non-living things	Living thing	Non-living thing
1.			
2.			
3.			
4.			
5.			

No.	Living and Non-living things	Living thing	Non-living thing
6.			
7.			
8.			
9.			
10.			
11.			

Characteristics of living things

There are seven main characteristics of living things. These characteristics are nutrition, respiration, sensitivity, movement, reproduction, excretion and growth.

Nutrition

All living things need food. See Figure 2. Food provides the body of living things with nutrients needed for their growth and development. The important nutrients include proteins, carbohydrates, fats, minerals and vitamins. The nutrients are important for growth, energy and body repair. Also, nutrients help to protect the body against diseases. Plants make their own food in the green leaves using the carbon dioxide gas and water in the presence of light.

(a) (b)

Figure 2: *Living things feeding*

Respiration

All living things respire. Respiration is a process where by living things obtain energy from food by taking in oxygen and releasing carbon dioxide. Respiration provides the body with the energy required for various activities.

Sensitivity

Living things sense and respond to stimuli in their environment. The ability of living things to detect and respond to stimuli in their environment is called sensitivity or irritability. Examples of stimuli are light, temperature and water. Animals detect stimuli by using sense organs such as the nose, skin, eyes, tongue and ears. Plants respond to stimuli using roots, stem, branches and flowers. Figure 3 shows how plants responding to light stimulus.

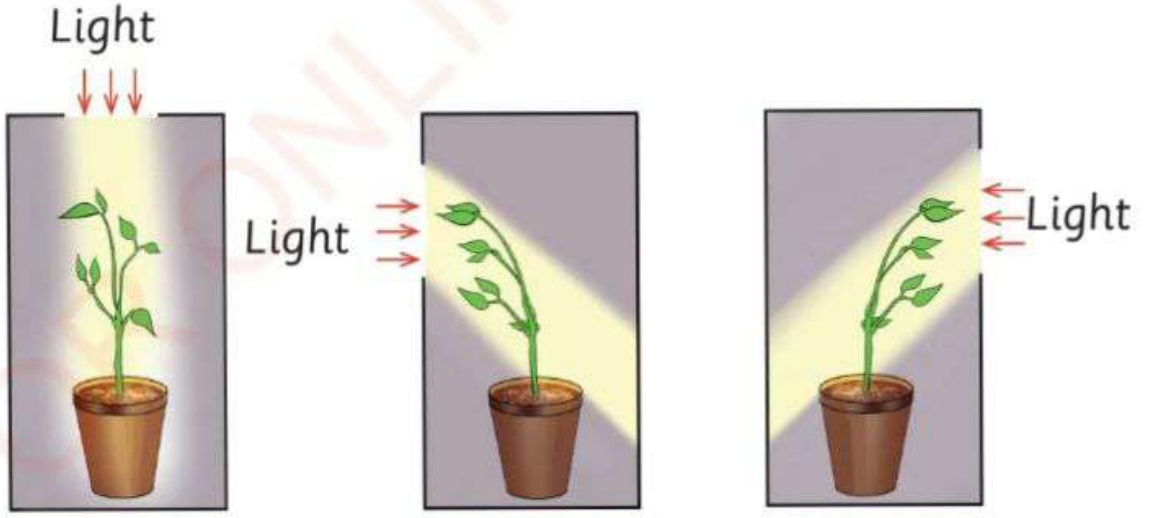


Figure 3: *Plants responding to light stimulus*

Movement

All living things move. Movement is the change of position or direction of a body or part of the body. Animal movement is usually visible. Animals can move from one place to another by walking, flying, crawling or hopping. See Figure 4. Movement in plants involves only certain parts, and not the whole plant. Movement in plants is mainly through bending, twisting and elongation of certain parts of plants. The movement in plants is very slow, and therefore, difficult to be seen. Movement enables living things to move to sources of food and water. Movement also enables living things to escape from danger.

Human being walking Frog hopping Bird flying

Figure 4: *Movements in animals*

Activity 2

Investigating how plant parts respond to light stimulus

Materials: Two (2) healthy potted plants, a box with a small hole that allows passage of light.

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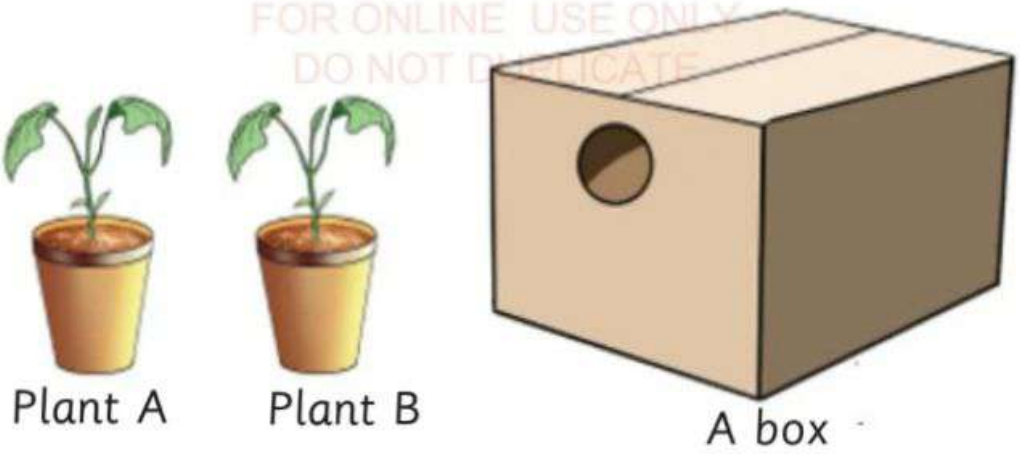

Figure 5: *Plants and a box with small hole*

Procedure

1. Label the two potted plants, A and B, and prepare a box with a hole.
2. Place plant A in a place with light. Place plant B in a box with a small hole. Make sure plant B receives light through a small hole of the box only. See Figure 6.

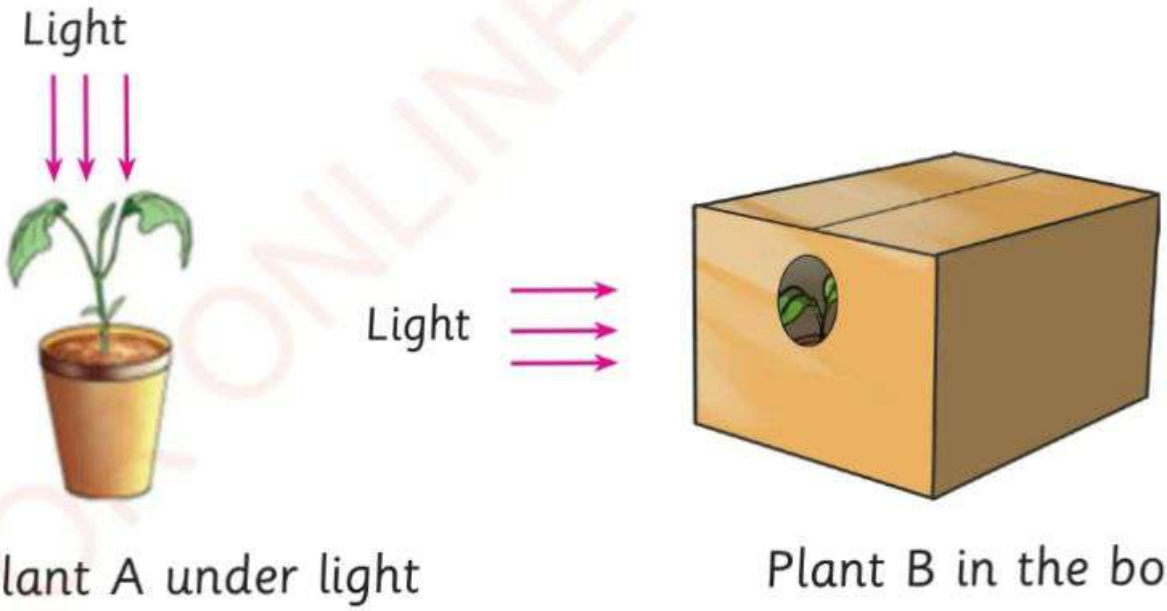

Figure 6: *Investigating how a plant moves towards light*

3. Leave the plants to grow for one week.
4. After one week, take plant B out of the box and observe the growth directions of plants A and B.
5. Compare plants A and B before and after the experiment. Write the findings as shown in the following Table.

Table: Comparing plants A and B before and after the experiment

Potted plants	Before the experiment	After the experiment
Plant A		
Plant B		

Results

Plant A grew upright, and plant B grew and bent towards the small hole which allowed light to pass through. Bending of plant B towards a small hole shows that plant B moved in response to the light stimulus.

Conclusion

Plant parts (shoots) move in response to light stimulus.

Reproduction

All living things reproduce. Reproduction enables living things or organisms to increase in number. Animals reproduce by giving birth to young ones or by laying eggs that hatch into young ones. Animals that reproduce by giving birth to youngs include human being, goat, bat and cat. Animals that lay eggs which hatch into youngs include chicken, snake, lizard and frog. See Figure 7. Plants reproduce using seeds or other means, including cuttings from stems or roots from mature plants. Reproduction is important for the continuity of generations.

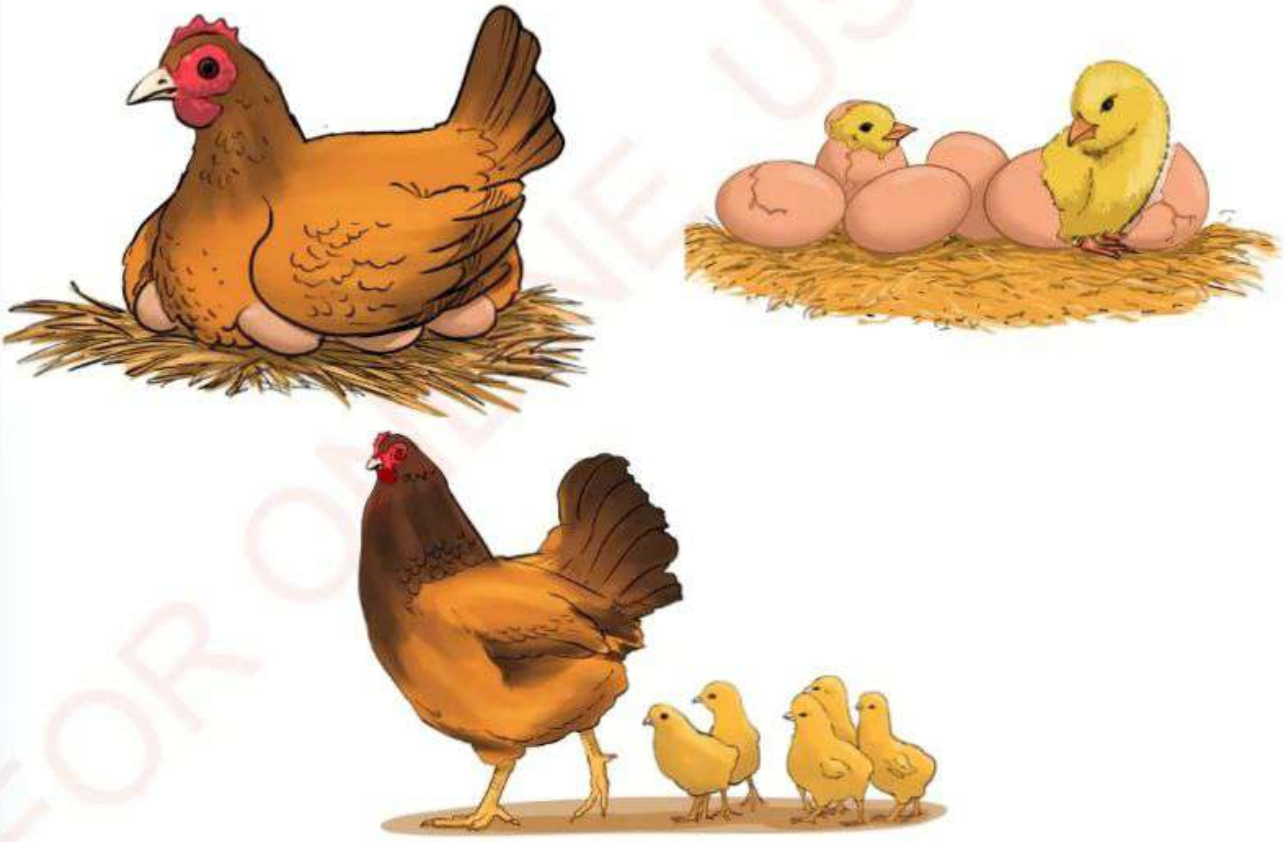

Figure 7: *Reproduction*

Excretion

All living things excrete wastes from their bodies. Excretion means getting rid of waste. In animals, excretion is carried out by kidneys, lungs and skin. Excretory materials get out of the body in the form of urine or sweat. Plants do not have special organs for excretion. Plants excrete wastes in the form of water vapour, gases, gums, oils, latex and resins. These wastes can be excreted through leaves, stems or roots.

Growth

Animals, including human beings grow by increasing in size and mass. They pass through different stages of development. The stages are infancy, childhood, adulthood and elderly. See Figure 8(a).

Figure 8(a): *Growth in human beings*

Plants grow into different heights and sizes. If you sow a seed, it will grow into seedling and later into a mature plant. See Figure 8(b).

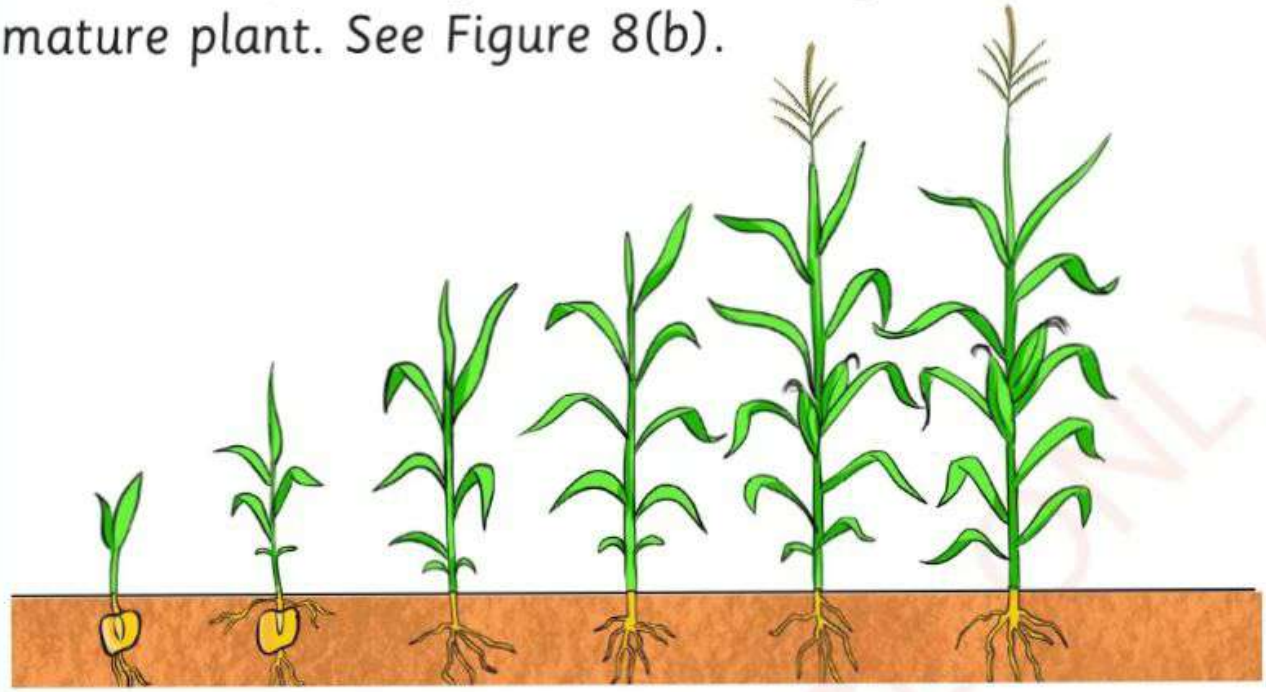

Figure 8 (b): *Growth in plants*

Activity 3

Observe things in the environment and read online sources to explore the importance of each of the seven characteristics of living things.

Exercise 2

1. Name any two living things that fly.
2. Name any two living things that crawl.
3. What will happen if living things are kept in a place without air?
4. What would happen if living things could not move?
5. Explain the importance of respiration in living things.

6. What will happen if living things will not reproduce?
7. Choose one organism and explain how it reproduces.

Groups of living things

There are two main groups of living things, namely animals and plants.

Activity 4

Use Figure 9 to group living things into their respective groups.

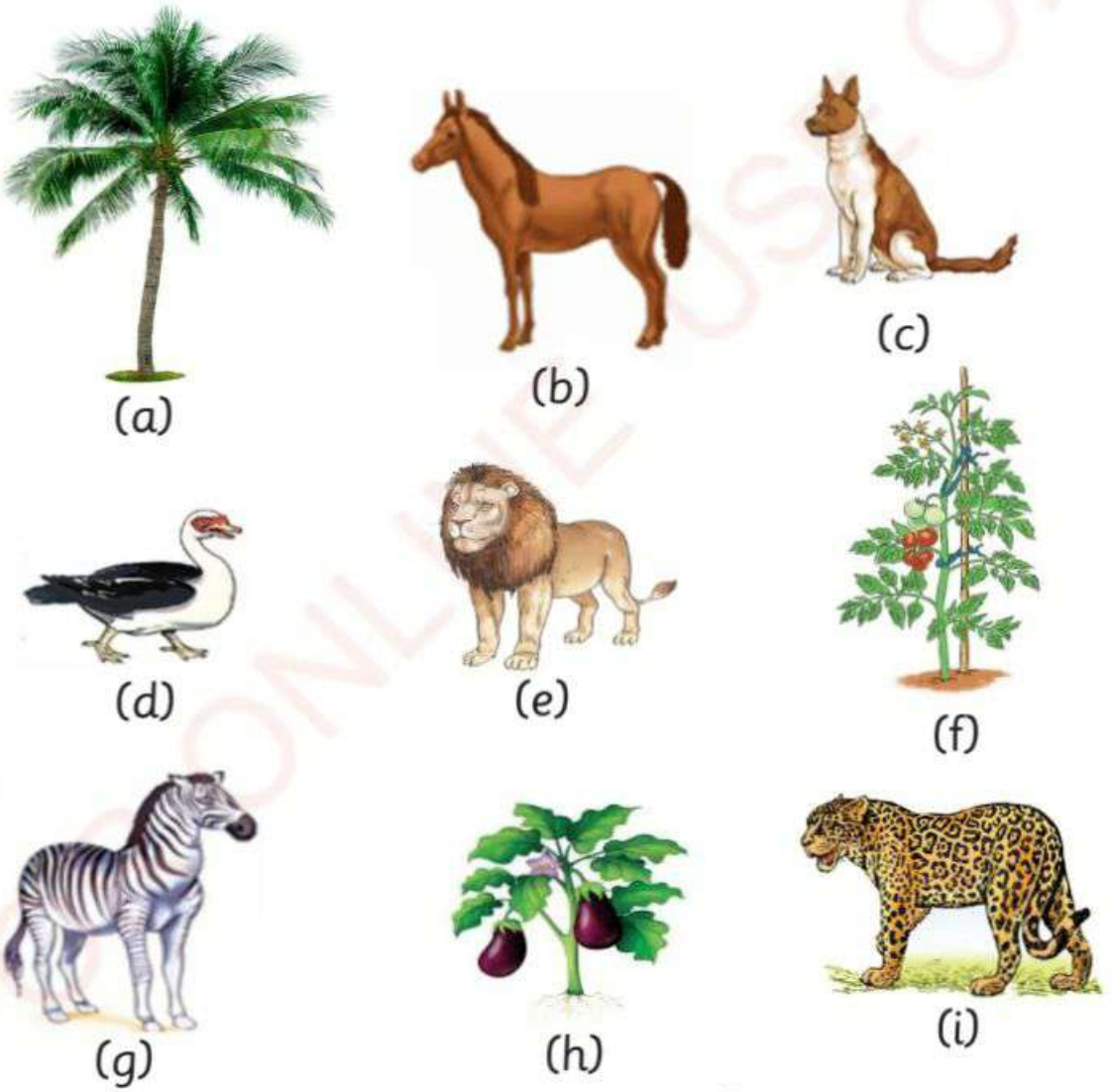

Figure 9: *Living things*

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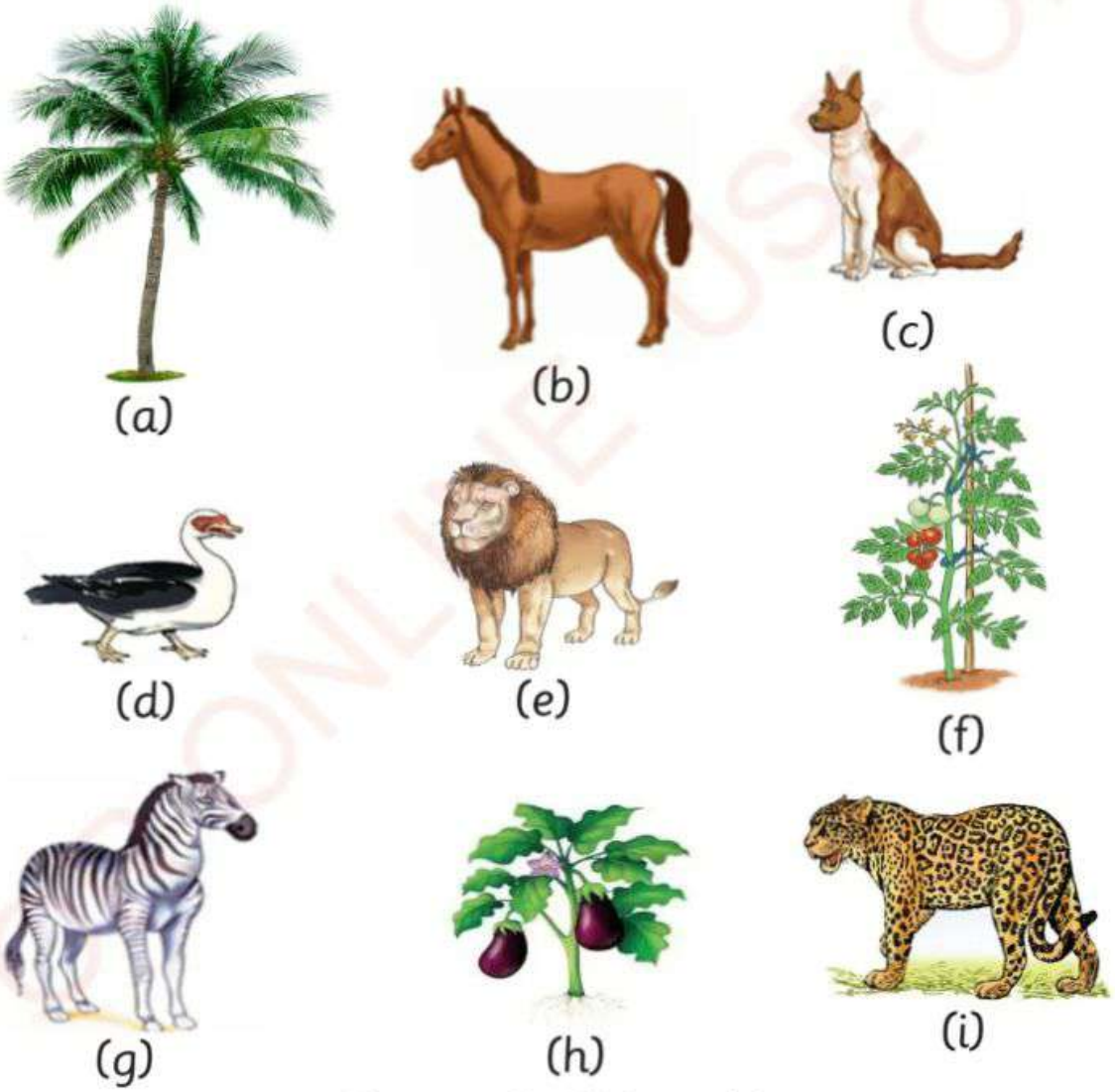


Figure 9: *Living things*

Animals

Animals can further be grouped into two main groups, namely vertebrates and invertebrates. Vertebrates are animals that have a vertebral column. The vertebral column is also known as the backbone. Invertebrates are animals with no vertebral column.

Activity 5

Identifying the vertebral column in animals

1. Pass your hand at the back of your body.
2. Touch the middle part of your back. What do you feel?

The vertebral column is made up of bones joined together, extending from the bottom of the head to the waist. For animals with tails, the vertebral column extends to the tail. The backbone protects the spinal cord and gives the body its shape.

Vertebrates

Vertebrates are divided into five groups, namely mammals, fish, reptiles, amphibians and birds. Examples of vertebrates are provided in Figure 10.

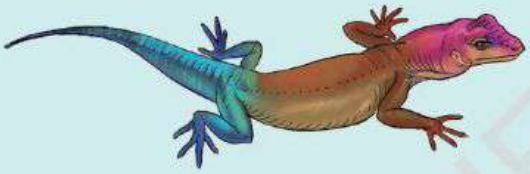
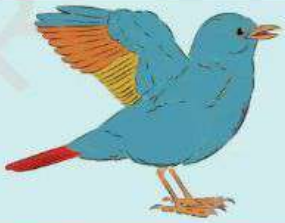
Animal	Vertebral column
Human being	
	
Fish	
	
Lizard	
	
Frog	
	
Bird	
	

Figure 10: *Vertebrates*

Fish

There are different types of fish and all live in water. Some fish, such as sharks, live in salt water. Others, such as Nile perch and catfish, live in fresh water. Figure 11 shows an examples of fish.

Tilapia

Catfish

Figure 11: *Fish*

General characteristics of fish

1. Some fish such as tilapia are covered with scales which overlap facing the tail. Other fish such as catfish and mackerel do not have scales
2. They reproduce by laying eggs.
3. They have fins which help them to swim and change direction.
4. They have streamlined bodies which help them to swim smoothly in water.
5. The body of a fish is covered with mucus which helps it to protect its body against pathogens.
6. They use gills for gaseous exchange.

7. They are cold-blooded animals. This means that their body temperature changes with the temperature of the environment.

Exercise 3

1. What makes fish swim smoothly in water?
2. Explain the function of gills in fish.

Amphibians

Amphibians are vertebrates that live in water and on land. Most animals in this group live in water during the early stages of their development. Examples of amphibians include frogs and toads. Figure 12 shows examples of amphibians.

(a) (b)

Figure 12: *Amphibians*

Activity 6

Use different sources of information, including online sources to explore amphibians.

1. Identify the amphibians that are found in different places.

2. Explain the characteristics of the amphibians you have identified.

General characteristics of amphibians

1. Most amphibians have four limbs; the fore limbs are shorter than hind limbs.
2. They have soft and moist skin which is used for gaseous exchange.
3. They also have gills for gaseous exchange during their early stages. At maturity, they use lungs and skin for gaseous exchange.
4. Amphibians reproduce by laying eggs in water.
5. They have a long tongue which helps them to catch food, such as small insects.
6. They are cold-blooded.

Reptiles

Some reptiles, such as crocodiles, turtles, lizards and some snakes live both on land and in water. Other reptiles, such as chameleons, lizards, tortoises and most snakes live on land. Figure 13 shows examples of reptiles.

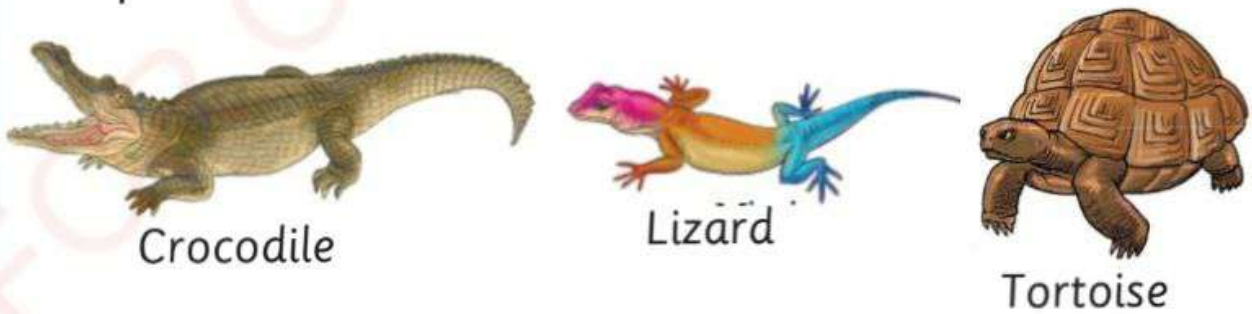


Figure 13: *Reptiles*

General characteristics of reptiles

1. They have dry skin covered with hard scales.
2. They reproduce by laying eggs on land.
3. Most reptiles move by limbs. Some reptiles such as snakes do not have limbs; they move by crawling.
4. They use lungs for gaseous exchange.
5. They are cold-blooded.

Exercise 4

1. What characteristics of a lizard differentiate it from a frog?
2. For each of the pictures, (a)–(e), put a tick (✓) if the animal in the respective picture is a reptile, and a cross (X) if is not.

No.	Animals	Reptiles
(a)		
(b)		
(c)		

(d)		
(e)		

Birds

Birds are vertebrates with feathers. Their bodies are covered with feathers. Some birds are domestic while others are wild. Examples of domestic birds are chickens, ducks, pigeons, guineafowl, peacock and parrots. Examples of wild birds include kites, owls, eagles, crows, quail and ostriches. Most birds live on land, but some spend most of their time in water. See Figure 14.

Peacock

Hen

Guineafowl

Quail

Figure 14: *Domestic and wild birds*

General characteristics of birds

1. They have a streamlined body, which helps them to fly easily.
2. Their bodies are covered with feathers, which help them to maintain body temperature.
3. They have wings, which help them to fly.
4. They have tough pointed beaks, without teeth.
5. They reproduce by laying eggs.
6. They have two legs which are covered with scutes.
7. They are warm-blooded. That means their body temperature does not change with the environment.

Exercise 5

1. List down any five domestic birds found in your environment.
2. What makes birds fly easily in the air?
3. Explain the importance of feathers to a bird.

Mammals

Mammals are vertebrates with mammary glands. In female mammals, the mammary glands secrete milk used for suckling or feeding their youngs. Examples of mammals are human beings, bats, whales, rats, elephants, dogs, donkeys, lions, horses, zebra, leopards, kangaroos, cows, goats, baboons and sheep. Figure 15 shows an example of mammals.

Figure 15: A *calf sucking milk*

General characteristics of mammals

1. All mammals have mammary glands. In female mammals the mammary glands produce milk that is used to feed their youngs.
2. Their bodies are covered with hair which help them to maintain the body temperature.
3. Mammals have skin with sweat glands.
4. Most mammals give birth to alive youngs.
5. Most mammals live on land. A few mammals, such as whales and porpoises live in water.
6. They are warm-blooded.
7. They use lungs for gaseous exchange.
8. They have external ears.

Exercise 6

1. Each of the following are the characteristics of vertebrates. Tick (✓) the group of vertebrates that corresponds to the characteristics provided.

Characteristic	Mammals	Reptiles	Birds	Fish	Amphibians
(a) They have scales and fins.					
(b) They lay eggs.					
(c) They give birth to youngs.					
(d) They can live on land and in water.					
(e) They have wings.					
(f) They have soft and moist skin used for gaseous exchange.					

2. Match the vertebrates with the groups they belong.

Animals	Group
(a) Eagle	(i) Mammals
(b) Tilapia	(ii) Reptiles
(c) Goat	(iii) Amphibians
(d) Frog	(iv) Birds
(e) Lizard	(v) Fish

Invertebrates

Invertebrates are animals which do not have a vertebral column or backbone. Examples of invertebrates include snails, earthworms and grasshoppers. See Figure 16.

Snail Earthworm Grasshopper

Figure 16: *Invertebrates*

Activity 7

(a) Observe vertebrates and invertebrates in your environment and list them down.
(b) Use online and other sources to explore the invertebrates.

Plants

There are different types of plants in our environment. Some plants grow in water while others grow on land. Examples of plants that grow in water are water hyacinths and water lilies. Examples of plants that grow on land are baobab tree and pawpaw tree. Figure 17 shows examples of plants.

Water hyacinths

Pawpaw tree

Water lilies

Baobab tree

Figure 17: *Plants which grow in water and on land*

Activity 8

Observing the main parts of a plant

Materials: a piece of paper, a fresh uprooted maize plant or any other plant in your environment

Procedure

1. Take a maize plant or any other plant and place it on a table.
2. Observe the plant and identify its parts.

Questions

(a) In which part of a plant are leaves borne?

(b) In which part of a plant are roots found?

(c) In which part of a plant is the stem found?

Parts of a plant

A plant has three major parts, namely roots, stem and leaves. See Figure 18. These parts perform different functions to enable plants to grow well.

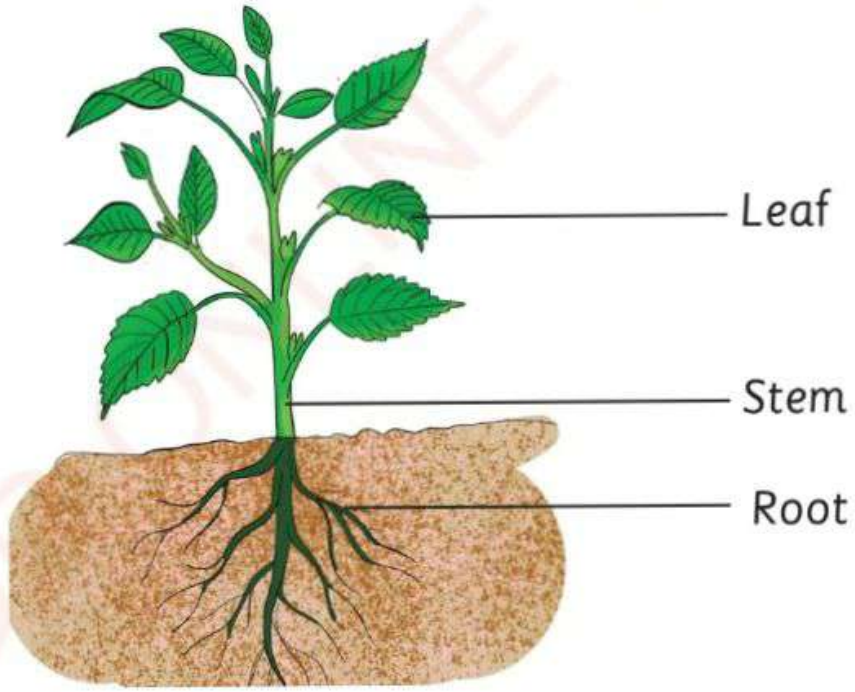


Figure 18: *Parts of a plant*

Roots

The main function of roots is to absorb water, minerals and nutrients from soil. Roots also hold the plant firmly in soil. In some plants, roots store food. Examples of plants that store food in their roots are carrots, cassava and sweet potatoes. See Figure 19.

Cassava

Carrot

Figure 19: *Plants that store food in roots*

Stem

The stem of a plant holds the leaves, flowers and fruits. The stem also transfers water, nutrients and minerals from the roots to leaves. The stems of some plants store food. Examples of plants that store food in the stems are pineapples, onions and sugarcane. See Figure 20.

Onion Sugarcane

Figure 20: *Plants that store food in the stem*

Leaves

The main function of the plant leaves is to make food for the plant. Leaves have small openings called stomata. The stomata open to allow passage of water and gases into and out of the plant and close to prevent loss of water and gases from the plant.

Activity 9

Use library or online sources to explore the main groups of plants.

Plants are divided into two main groups, namely flowering plants and non-flowering plants.

Flowering plants

These are plants that bear flowers. The flowers are important for reproduction. Most of the flowering plants

bear fruits that contain seeds. Seeds can germinate into seedlings that grow into mature plants. Examples of flowering plants are wheat plant, bean plant, mango tree, pea plant, rice plant, sunflower plant, rose flower plant and maize plant. Parts of a flower include sepals, petals and receptacle. See Figure 21.

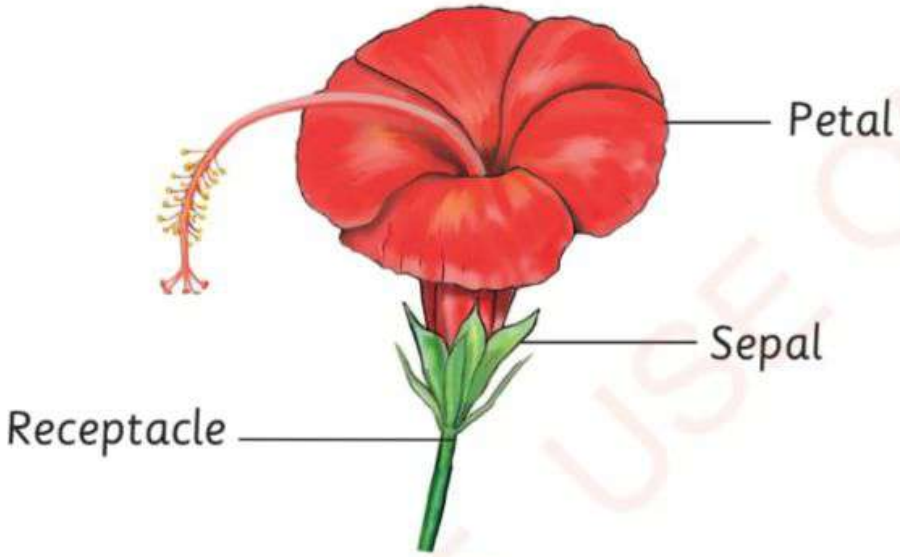


Figure 21: *Parts of a flower*

Non-flowering plants

Non-flowering plants are plants that do not bear flowers. These plants produce naked seeds. Examples of non-flowering plants include pine tree and fern plant. See Figure 22.

Pine tree

Fern plant

Figure 22: *Non-flowering plants*

Interdependence among the living things

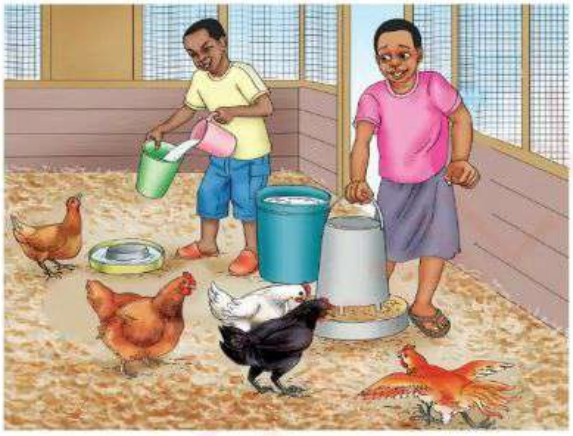
Living things depend on each other in many ways. Plants and animals depend on each other for food, shelter and air. Plants depend on animals to disperse their seeds from one place to another. Animals depend on plants for food and shelter. Also, plants use carbon dioxide produced by animals during gaseous exchange to make their own food. When making their food, plants produce oxygen. Oxygen produced by plants is used by animals for gaseous exchange.

Care for living things in their environment

Living things are valued by taking care of them and providing them with their needs. These needs include air, food, light and water. Caring for living things will

make them survive, grow and reproduce. Animals need to live in a safe place with food, water and air. Plants also need light, water, air and nutrients. See Figure 23.

(a)
Caring for plants



(b)
Caring for animals

Figure 23: *Caring for living things*

Revision exercise

Section A: Choose the correct answer.

1. If a sunflower plant grows towards sunlight, it is an indication that:
   (a) plants move.
   (b) plants are non-living things.
   (c) sunflower is a non-living thing.
   (d) plants do not grow.
2. Which of the following actions shows that plants depend on animals?

(a) Plants use carbon dioxide and oxygen to make their food.
(b) Plants absorb carbon dioxide and oxygen from animals and release oxygen.
(c) Plants use oxygen that comes from animals to make their own food.
(d) Plants use carbon dioxide that comes from animals to make their own food.

3. Which of the following pictures represents living things that reproduce by laying eggs?

			
(a)	(b)	(c)	(d)

4. _____ is an example of an organism whose body is streamlined and covered with feathers.
(a) Mosquito
(b) Goat
(c) Eagle
(d) Butterfly

5. Which of the following plants produces naked seeds?
(a) An orange tree
(b) A pine tree
(c) A maize plant
(d) A mango tree

6. Which of the following is the correct group of flowering plants?
   (a) Sunflower, maize, pine and beans
   (b) Wheat, beans, sunflower and maize
   (c) Peas, beans, pine and mangoes
   (d) Potatoes plant, cedar, coconut and baobab trees

Section B: Write **TRUE** for a correct sentence and **FALSE** for an incorrect sentence.

7. Plants can make their own food.
8. Living things detect and respond to changes in the environment.
9. Animals move by changing direction only.
10. Non-living things can reproduce.

Section C: Short answer items.

11. Name any five plants that are food sources for animals.
12. List down the names of any four vertebrates.
13. Explain how plants and animals depend on each other in using oxygen and carbon dioxide gases.

Vocabulary

Carbon dioxide	a gas released by organisms during gaseous exchange
Interdependence	a tendency of depending on each other
Oxygen	a gas used by organisms during respiration
Scute	a hard scale layer covering legs of birds
Stimulus	anything that can evoke a response in a living thing
Streamline	a kind of body shape that becomes thinner tapering towards the end

Chapter Four

Scientific investigation

Introduction

Scientific investigation enables us to find answers to scientific questions or problems. In this chapter, you will learn the meaning of scientific investigation. You will also learn the steps in conducting scientific investigation. Moreover, you will perform simple experiments on living and non-living things. The competencies developed will enable you to apply scientific methods in your everyday life to solve various challenges in society.

Think

The importance of scientific investigation in daily life

Meaning of scientific investigation

A scientific investigation is the process of finding answers to questions using various research methods. Research involves searching information. We search information for the purpose of creating new knowledge or

advancing the existing knowledge. Scientific investigation uses scientific methods to find answers to questions. Scientific investigation involves systematic or step by step procedure.

Activity

Observe the pictures in Figure 1, then answer the questions that follow.

(a) (b) (c)

Figure 1: *Various phenomena*

Questions

1. What do you see in Figure 1? Explain.
2. Mention three (3) other phenomena you have experienced but you have no explanations as to why they happened.

From Figure 1, you could ask yourself different questions, such as:

1. Why does a person get sick?
2. Why does it rain?
3. Why does a fruit fall from a tree?

Therefore, answers to these questions can be obtained through scientific investigation. A scientific investigation is a way of finding answers to questions through scientific methods.

Reasons for conducting a scientific investigation

A scientific investigation is conducted for a particular purpose. The purposes or aims of scientific investigations include: to find out answers to scientific questions, to generate new knowledge or ideas, to prove or disprove scientific principles, to test hypothesis, or to describe natural phenomena.

Materials for scientific investigation

Different materials are needed to conduct scientific investigation. The types of materials to be used depend on the type of the investigation to be conducted. The materials may include:

(a) Living things like plants, or their parts such as leaves, stems, seeds, roots or flowers; or animals or their body parts such as meat, bones and hair;

(b) Non-living things, such as soil, stones, water, acids, bases and salt;

(c) Tools such as tape measure, beam balance, stopwatch, thermometer and beaker; tools for observing very small organisms or objects, such as hand lens and microscope; materials or containers for keeping or storing samples for example plastic bags, bottles and fridge; and

(d) Materials for recording data, which include notebook, pen, marker pen and pencil.

Steps in conducting a scientific investigation

A scientific investigation is conducted by following a systematic procedure. It involves problem identification, hypothesis formulation, preparing materials for experiment, conducting an experiment and collecting data, analysing data, interpreting results, conclusion and writing a scientific report. See Figure 2.

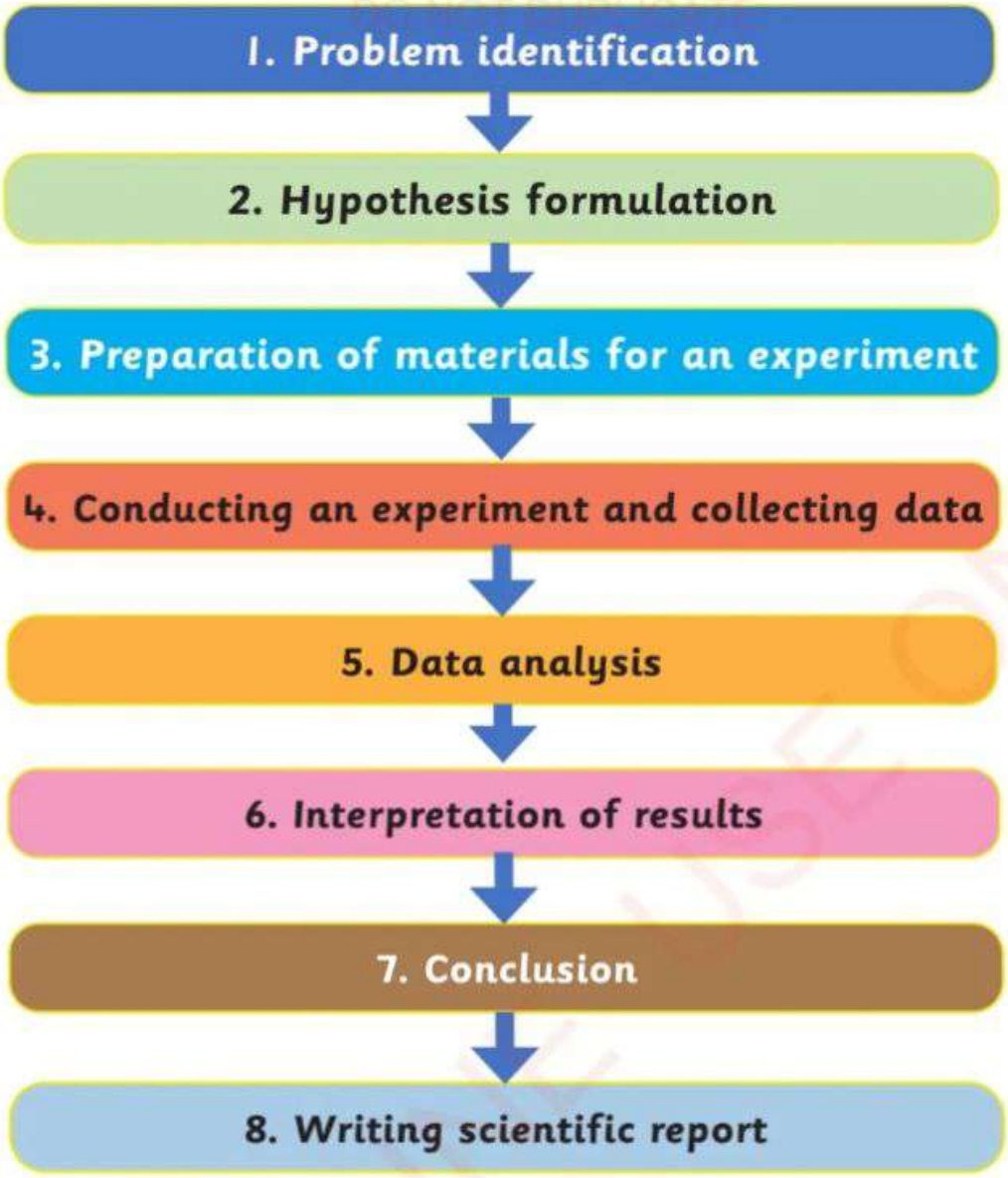


Figure 2: *Steps in scientific investigations*

Carefully, read the following passage and answer the following questions

Mr Samanga has two children. The two children prepared gardens and grew amaranth. The amaranth in the first child's garden grew well. It did not grow well in the second child's garden.

One day, their father visited the gardens. He asked them why the amaranth in one garden grew well while it did not grow well in the other garden. The first child did not have answers. The second child said that the amaranth did not grow well probably due to shortage of water.

Their father told them that answers to scientific questions need scientific investigation. Therefore, they should conduct an experiment to get answers to their problem.

Questions

1. What have you learnt from the passage above?
2. What do you think caused the difference in amaranth growth between the two gardens?

The steps in conducting a scientific investigation are briefly explained as follows:

1. Problem identification

The first step in conducting a scientific investigation is to identify the problem which needs to be solved or which requires an answer. For example, the differences in growth of amaranth between the two gardens could be a problem which can be explained through a scientific investigation.

2. Hypothesis formulation

A hypothesis is an intelligent guess about the cause of the problem under investigation. In this step, you

guess the cause of the identified problem or what could be the answer to the problem at hand. For instance, for the given amaranth problem, one hypothesis could be that "the growth of amaranth is affected by the amount of water". The importance of this step is to be able to set direction of an investigation which will accept or reject the hypothesis. If the hypothesis does not answer your question, you need to formulate another one.

3. Preparation of materials for the experiment

In this step, you gather the materials needed to collect information in your investigation. You then identify the location where the investigation will be conducted. If you do not have appropriate materials, you may end up collecting wrong data and the entire experiment may fail to solve the problem. For example, materials which can be used in the investigation of the differences in amaranth growth are hand hoe, bucket, water and amaranth seeds. The site must have enough sunlight and the soil must be fertile.

4. Conducting the experiment and collecting data

In this step, the experiment is conducted by using the prepared materials. For example, you can plan to plant amaranth seeds in two gardens. After the seeds germinate, water the first garden in the morning and evening but do not water the second. Measure the length of amaranth plants in each garden after every

two days. This step involves data collection from the experiment. Data should be collected and recorded in a notebook.

5. Data analysis

The data collected during an investigation must be analysed. This involves organising, sorting and arranging data properly. For example, you can compare the length of the amaranth plants from the watered and unwatered gardens to identify the differences in their growth.

6. Interpretation of results

In this step, the analysed data are interpreted in order to obtain meaningful information. This may enable others who are interested in the study to understand the problem and solutions. The interpreted results can be presented through descriptions, tables, figures, charts and graphs. An example is presented in the following table.

Table: Importance of water in amaranth growth

Type of garden	Day 1	Day 3	Day 5	Day 7	Day 9	Results
Watered garden	1 cm	2 cm	4 cm	6 cm	8 cm	Amaranth grew well.
Unwatered garden	1 cm	1 cm	1 cm	1 cm	2 cm	Amaranth grew poorly.

Based on the data shown in the table, the watered amaranth grew better than the unwatered amaranth.

7. Conclusion

In this step, you can prove the hypothesis. You can also link the results obtained with the cause of the problem and the question you asked. If the results support the hypothesis, the conclusion can be "there is a relationship between the growth of amaranth and water availability". If the results do not support the hypothesis, the conclusion will be "there is no relationship between the growth of amaranth and water availability".

8. Writing a scientific report

A scientific report is written after completing the scientific investigation. It is organised in a systematic order.

Exercise

1. Arrange the following steps for conducting a scientific experiment in the correct order:
   Conducting an experiment and collecting data, Hypothesis formulation, Interpretation of results, Conclusion, Problem identification, Data analysis, Preparation of materials for an experiment, Writing scientific report.

2. State the importance of the following steps of scientific investigation.
   (a) Hypothesis formulation
   (b) Interpretation of results
   (c) Conclusion

A simple experiment on living and non-living things

Experiment 1: Investigating excretion in plants

Aim: To show that plants excrete water vapour through leaves

Materials: A plant with leaves, a string or rubber band and a transparent plastic bag

Procedure

1. Wrap a plant leaf or leaves in a transparent plastic bag. Do not detach the leaf or leaves from the plant.
2. Tie the plastic bag with a string or rubber band to make sure air does not pass. See Figure 3.

   Note: Make sure the plastic bag is not torn.

Figure 3: *A leaf wrapped in a plastic bag*

3. Leave the set up for two hours.
4. Observe what happened.

Results

1. Write the results of the experiment.
2. What have you learnt from the experiment?

Conclusion: Write the conclusion of the experiment.

Experiment 2: Investigating the differences between living and non-living things

Aim: To show that living things move and respond to stimulus while non-living things do not move and respond to stimulus

Materials: Two jars with small holed lids, a stone, a stick and alive cockroach

Procedure

1. Put the stone and cockroach in a separate jars.
2. Cover the jars with the lids. See Figure 4.

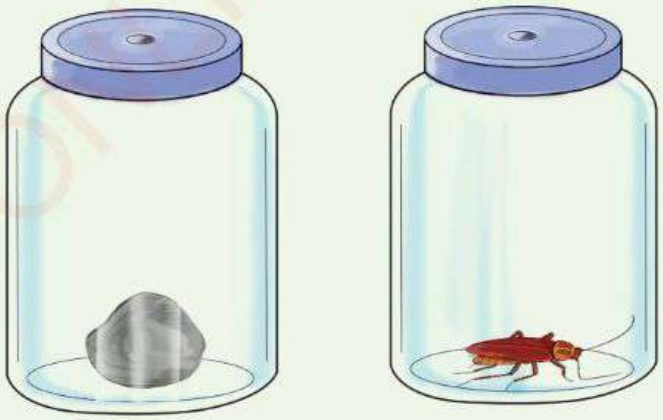


Figure 4: *A stone and cockroach in covered jars*

3. Put the two jars on a table.
4. Use a stick to touch the cockroach and the stone through the opening of the jar.
5. Observe carefully what happens in each jar.

Results

Write the results of the experiment.

Conclusion: Write the conclusion of the experiment.

Experiment 3: Investigating the importance of oxygen to animals

Aim: To demonstrate that oxygen is essential to animals

Materials: Two alive grasshoppers, two jars, a lid, net and fresh leaves

Procedure

1. Label one jar as A and another as B.
2. Put the fresh leaves in each jar.
3. Put one grasshopper in jar A, then cover it with a net.
4. Put the second grasshopper in jar B and cover it with an air tight lid. See Figure 5.
5. Observe the two grasshoppers in the jars after two days.

Figure 5: *Grasshoppers in ventilated and air tight jars*

Results: Write the results of the experiment.
Conclusion: Write the conclusion of the experiment.

Revision exercise

Section A: Write **TRUE** for a correct statement and **FALSE** for an incorrect statement.

1. Animals need air to survive.
2. A Standard Three pupil can do an experiment and discover new knowledge.
3. Development of science and technology does not need scientific investigation.
4. The aim of scientific investigation is to avoid guessing of findings.
5. You can get scientific answers through stories.

Section B

6. A pupil tried to find out answers to the question "how plants respond to stimuli?" List the steps that the pupil had to follow to get the answers.

Vocabulary

Data	information derived from an experiment or research used to explain or prove something
Germination	development of a plant from a seed
Hypothesis	inferences or preliminary predictions about the causes of the identified problem
Scientific procedure	steps followed when conducting an experiment that help in solving a problem

Chapter Five

Simple ICT games

Introduction

Simple games can be used in learning. In this chapter, you will learn to use Information and Communication Technology (ICT) to play simple games. The competencies developed will enable you to improve your thinking, solve challenges and explain scientific ideas.

Think

Simple games that improve scientific ideas

Simple games

Various scientific ideas can be presented through simple games. Some games can be played well through ICT devices such as desktop computers, laptop, tablets and phones.

Activity 1

Observe the picture in Figure 1 and answer the questions that follow.

Figure 1: *Pupils using ICT devices*

Questions

1. What are the ICT devices shown in Figure 1?
2. Where can you find such devices?

Advantages of using simple games in learning

There are many advantages of using simple games in learning. These advantages include creating happiness and confidence in learning. Simple games will help you to learn independently and in groups. They will also improve your creativity and problem solving skills.

The ICT games

There are various types of simple ICT games. Each game has a goal and instructions on how to play. Some of the games need certain principles when playing. They are arranged based on the learning of simple to difficult ideas. The games you will learn include a maze game, path encoding, path decoding, a simplified tower of Hanoi, a simple drawing game and programming maze. In learning and playing these games, you will use the educational software. This software is called "GCompris". It can be downloaded from https://tie.go.tz/pages/download-software.

Activity 2

Navigating a maze

Maze

Name of the game: A maze game

Goal: To help Tux escape from the maze and find its way home

Duration: 20 minutes

Requirements: *Desktop computer, laptop, tablets or mobile phones installed with the game*

Instructions

1. *Use the arrow buttons on your screen or swipe in the direction you want Tux to move.*
2. *Your goal is to guide Tux out of the maze and reach the exit. See Figure 2.*

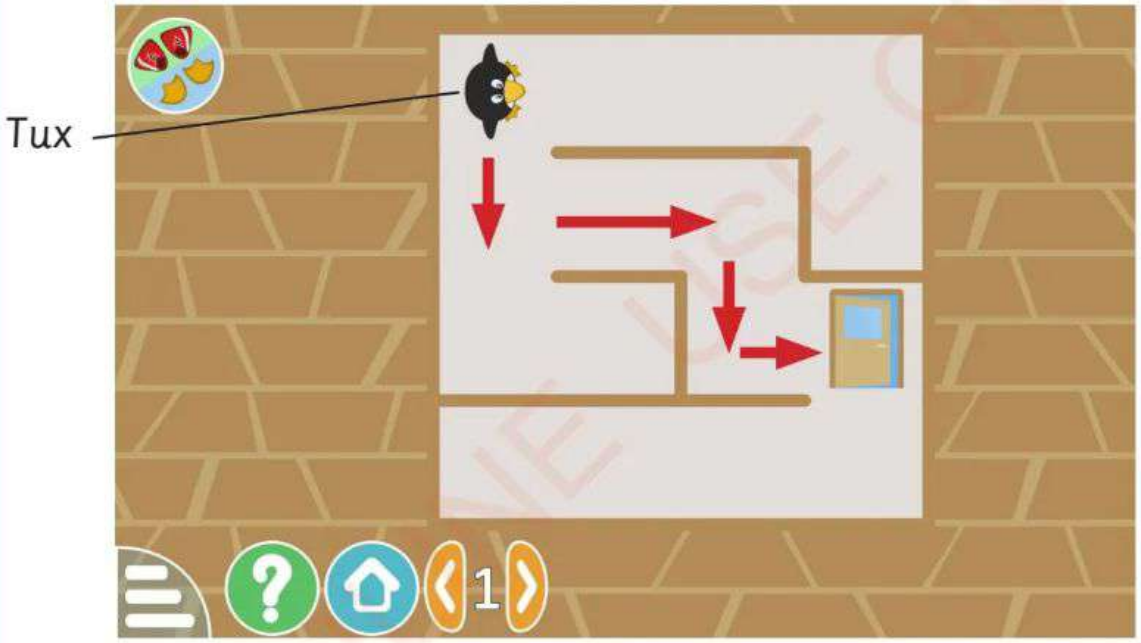


Figure 2: *Maze game*

Note: *You can try to escape the maze up to eight times. Each time, the maze will have a different layout.*

Exercise 1

1. What happens when Tux bumps into a wall in the maze?
2. Did you ever guide Tux in the wrong direction? What happened then?
3. Did you correct Tux's direction after realising it was wrong? How did you do it?
4. How did you direct Tux through the maze?
5. What daily activities or other games are related to the maze game?

Activity 3

Finding the way

Name of the game: Path encoding

Goal: To help Tux find its path to reach the flag

Duration: 20 minutes

Requirements: Desktop computer, laptop, tablets or mobile phone installed with the game

Instructions

1. Press the arrow buttons to move Tux along the path. The aim is to reach the flag shown in Figure 3.

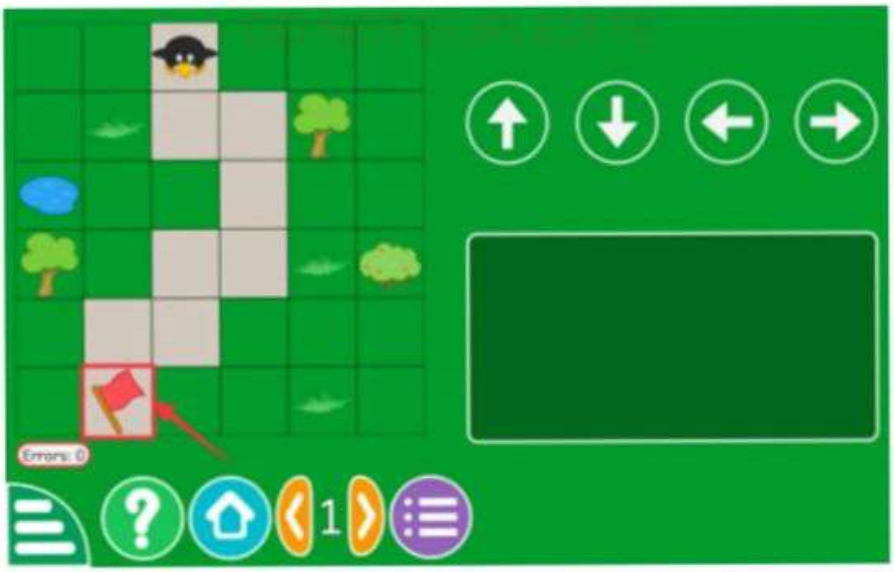


Figure 3: *Path encoding game*

2. Remember, the arrows always move the Tux in the direction as indicated: ↑ means up, ↓ means down, ← means left, and → means right, no matter which direction Tux is facing. See Figure 3.

Note: You can try to play different levels of the game and resolve many paths.

Exercise 2

1. What happens when Tux steps into the wrong part?
2. What takes place when Tux walks into areas with things like trees or bushes?
3. How many times did you make a wrong move?
4. How can you use the playing skills of the game at school or home?

Activity 4

Finding the logic

Name of the game: Path decoding

Goal: To guide Tux through the journey to reach the flag

Duration: 20 minutes

Requirements: Desktop computer, laptop, tablet or mobile phone installed with the game

Instructions

1. Tap the squares on the grid to move Tux, following the arrows that show the right path. See Figure 4.
2. Keep in mind that the arrows always guide you in the direction: ↑ means up, ↓ means down, ← means left, and → means right, in any direction that Tux is facing. See Figure 4.

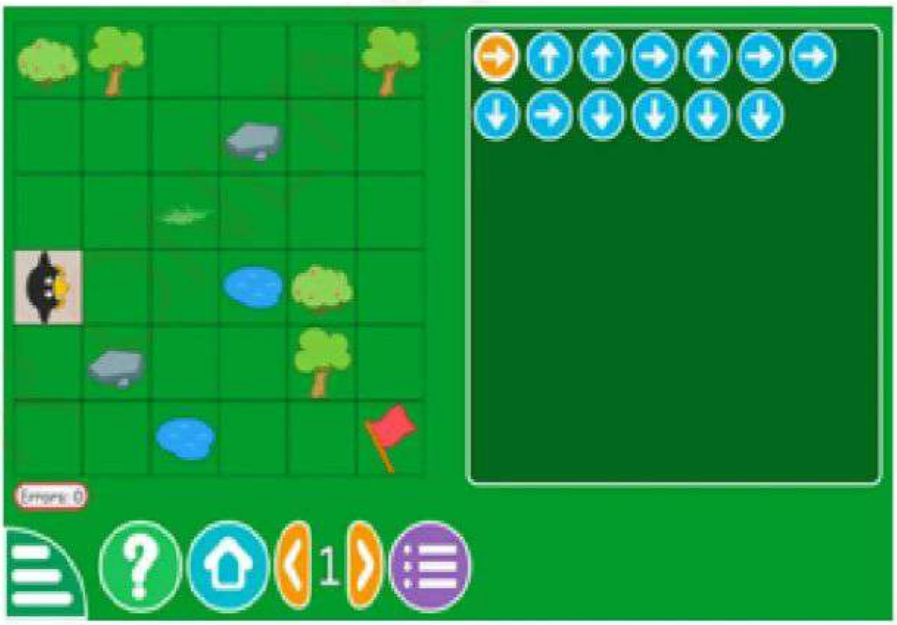


Figure 4: *Path decoding game*

Note: You can try to play different levels of the game and resolve many paths.

Exercise 3

1. What happens when Tux steps on squares of the grid with obstacles like rocks or lakes?
2. How many wrong moves did you make?
3. What did you do to reduce the number of wrong moves in your next levels?
4. Explain the tricks you used to complete the game without making any error.
5. What skills did you learn from the game?

Activity 5

Using logic

Name of the game: Simplified Tower of Hanoi

Goal: To construct a tower at the empty area

Duration: 20 minutes

Requirements: Desktop computer, laptop, tablet or mobile phone installed with the game

Instructions

1. Look at the tower on the right side and observe the signs on each piece as shown in Figure 5. Your goal is to build an identical tower in an empty area by moving one piece at a time.
2. Drag and drop only the top piece of any tower to move it to another tower or the empty area. See Figure 5.

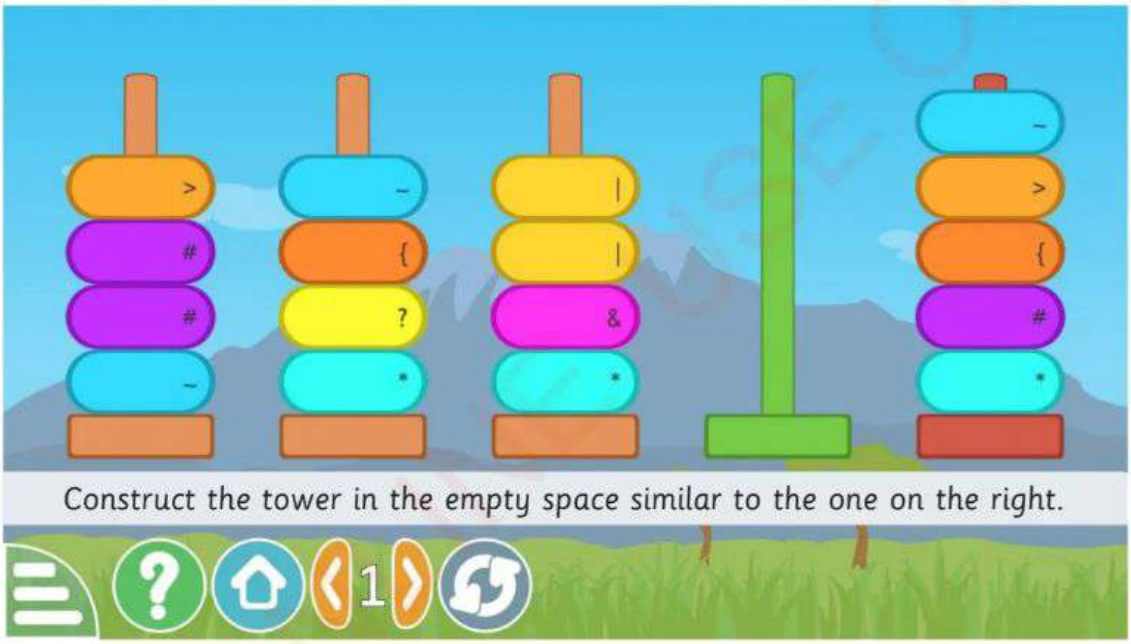


Figure 5: *Simplified Tower of Hanoi game*

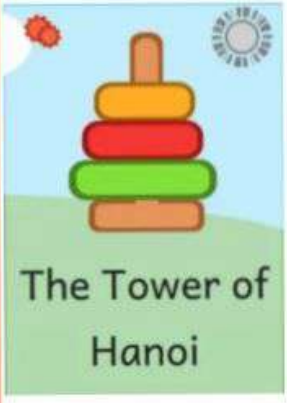
Note: You can attempt to complete different levels of the game and master more challenging stages.

Exercise 4

1. What happens when you successfully build the entire tower in the empty area?
2. Can you move a piece from the bottom of the tower before moving the pieces on top? Why?
3. What rules did you learn about the order in which the pieces are arranged?
4. What lesson did you learn from this game?

Activity 6

Using logic



The Tower of Hanoi

Name of the game: The Tower of Hanoi

Goal: To move all the pieces to the empty peg on the right side

Duration: 20 minutes

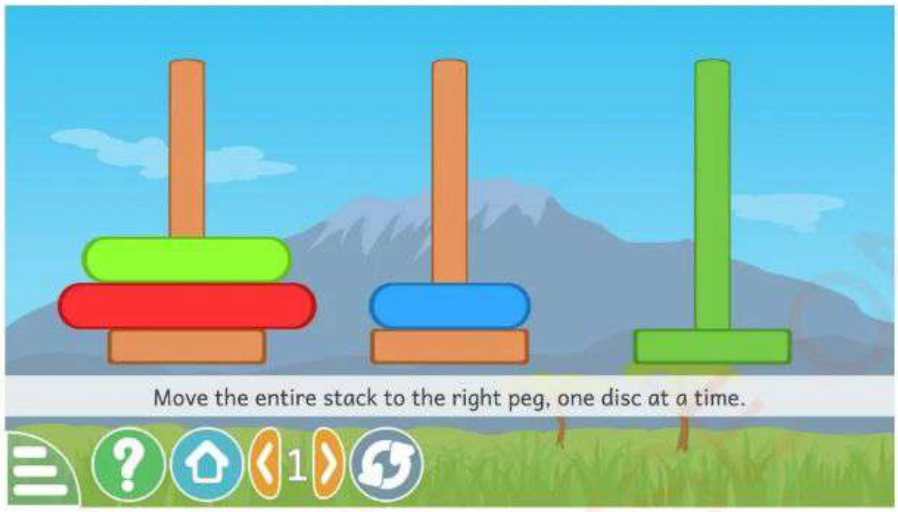
Requirements: Desktop computer, laptop, tablet or mobile phone installed with the game

Rules

1. You can only move one piece at a time.
2. A bigger piece cannot be placed on top of a smaller one.

Instructions

1. Drag the top piece from one peg to the other.
2. Rebuild the tower on the empty peg on the right side. See Figure 6.



(a) Starting of Tower of Hanoi game

(b) End of Tower of Hanoi game

Figure 6: *Tower of Hanoi game*

Note: Feel free to play the game many times through all the levels.

Exercise 5

1. Did you find this tower of Hanoi game easier or harder than the simplified tower of Hanoi game? Why?
2. What happens when you place a larger piece on top of a smaller one?
3. What daily activities are related to this game?

Activity 7

Creating your own painting


A simple drawing activity

Name of the Game: A simple drawing game

Goal: To make colourful and attractive artwork

Duration: 20 minutes

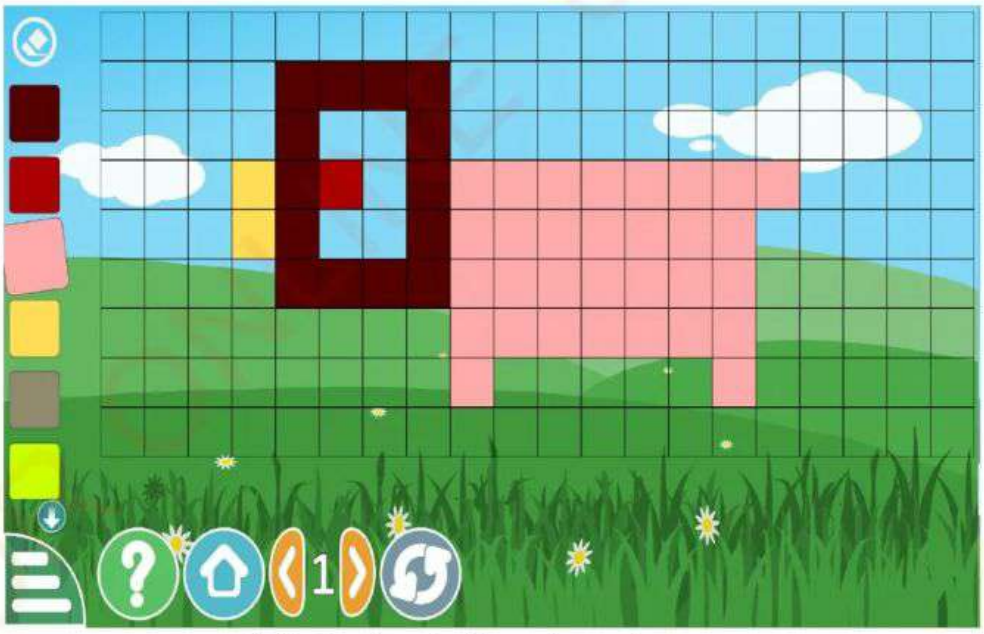
Requirements: Desktop computer, laptop, tablet or mobile phone installed with the game

Instructions

1. Pick your favourite colour from the colour palette.

2. Use your finger or a stylus to paint within the shapes on the screen. See Figure 7(a). Make them as colourful as you wish, as shown in Figure 7(b).

(a) Beginning of the drawing game



(b) End of the drawing game

Figure 7: *Simple drawing game*

Note: You can create different artworks. Feel free to learn and improve your creativity.

Exercise 6

1. How many artworks did you create?
2. What kinds of shapes did you colour?
3. What kinds of colours did you use more to colour? Why?
4. What did you learn about painting the artworks with more colours?
5. What was intresting about this game?

Activity 8

Feeding Tux

Name of the Game: Programming maze

Goal: To help a hungry Tux find a fish by guiding it through the maze

Duration: 20 minutes

Requirements: Desktop computer, laptop, tablet or smartphone installed with the game

Instructions

1. Look at the control panel that has different moves like 'Go Forward,' ↑ 'Turn Left,' ↺ and 'Turn Right' ↻. See Figure 8.

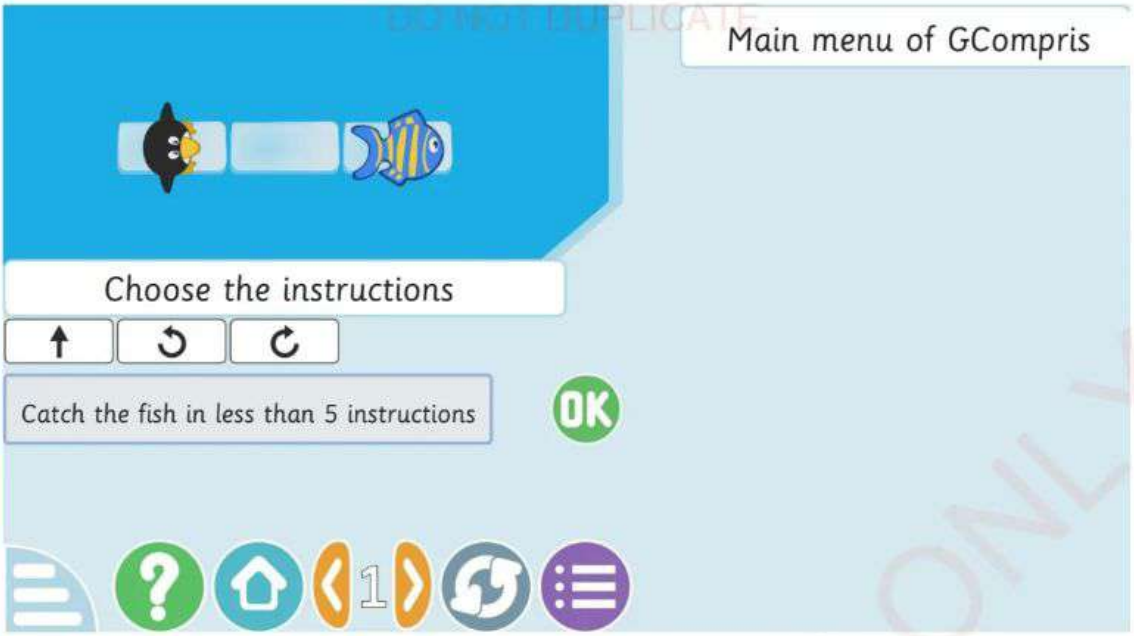


Figure 8: *Programming maze game*

2. Pick the instructions from the control panel.
3. Arrange these instructions in the main function to guide Tux to the delicious fish. See Figure 8.
4. Complete all the instructions depending on the path. Then, press OK as shown Figure 8.

Note: You can play the game as many times as you would like.

Revision exercise

1. How many times did you help Tux find its fish meal?
2. What moves did you use to guide Tux to the fish?
3. How could you predict and plan techniques to move Tux?

4. Which game was the most interesting for you?
5. What made that game more interesting?
6. What important things did you learn from playing these games?
7. How can you use the games to do other things at home or school?
8. Why is it important to use simple games in learning?

Vocabulary

Program	a set of instructions that a computer follows to perform a particular task or function
Decoding	translating a sign or symbol into a language
Encoding	converting a language into a system of signs or symbols
Internet	the worldwide network of interconnected ICT devices that enables communication, and sharing of resources such as information
Logic	a particular way of thinking that is reasonable and based on good judgment

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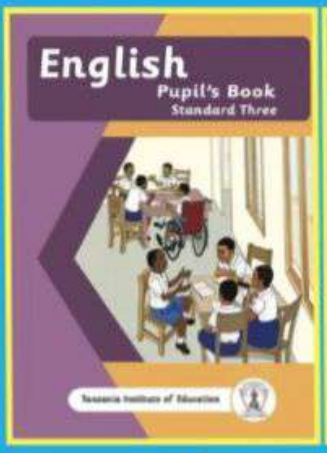
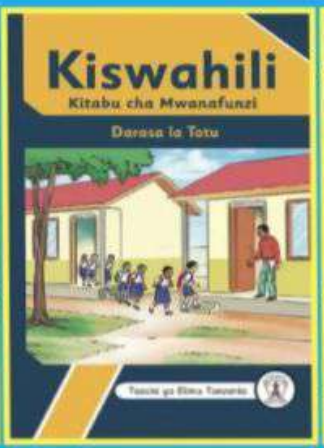
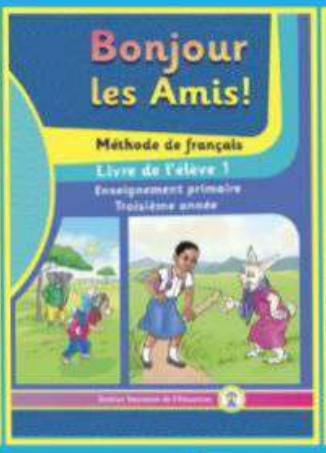
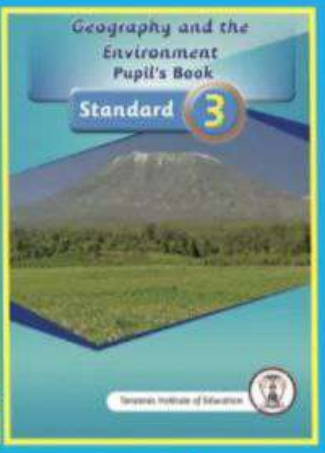
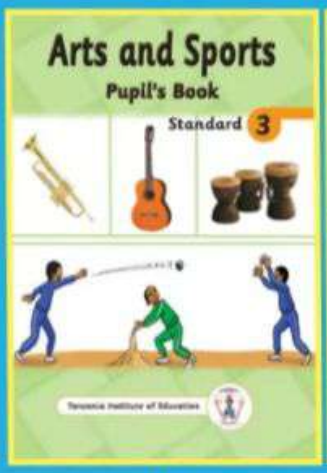
Standard Three

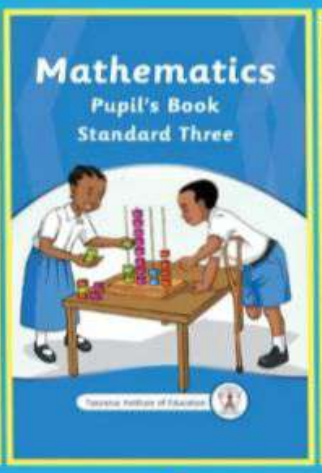


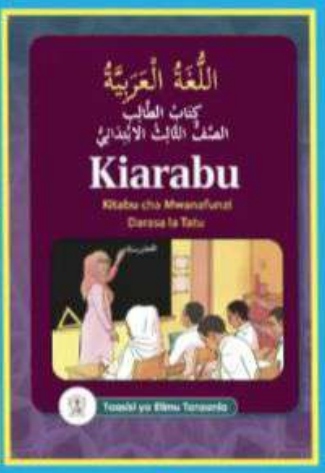


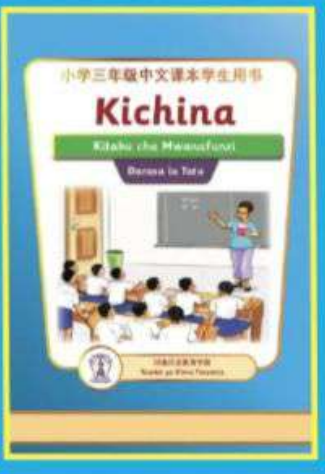












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