

Ruben's Series

Science Textbook For Basic Five

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*The Reader,
Our Priority*

APPROVED BY NaCCA

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STRAND 1

DIVERSITY OF MATTER

SUB-STRAND 1: LIVING AND NON-LIVING THINGS

SUB-STRAND 2: MATERIALS

SUB-STRAND 1: LIVING AND NON-LIVING THINGS

By the end of this sub-strand, the learner will:

CONTENT STANDARDS	INDICATORS
B5.1.1.1 Understand the physical features and life processes of living things and use this understanding to classify them.	B5.1.1.1.1 Know the life processes of living things (growth, sensitivity to the environment, respiration and excretion).
B5.1.1.2 Demonstrate understanding of the differences between living things, non-living things, and things which have never been alive.	B5.1.1.2.1 Compare the differences among things that are living, dead and things that have never been alive.

SUB-STRAND

1

LIVING AND NON-LIVING THINGS

Hello Young Scientist!

Congratulations for making it to basic 5.

In this book, we will delve into the topics you studied in your previous classes to broaden your understanding.

Learning science is fun and interesting. It will help you understand a lot of things you see happening around you.

Do you know that you can become a science facilitator, a doctor, a nurse, an engineer, a pharmacist or a pilot if you study science seriously?

Enjoy and have fun reading and exploring your Basic 5 Science book.

I wish you the best.

I.I.I.I LIFE PROCESSES OF LIVING THINGS

Keywords

Life processes	Sensitive	Reproduce	Stomata	Transpire
Stimulus	Excrete	Waste substance	Respire	

Introduction

Everything around us is either a living thing or a non-living thing. Look around your environment.

What are some of the things you see around you in your environment? In our environment, there are human beings, cars, animals, buildings and trees.



Some examples of things found in our environment

Which of these things are living things and which ones are non-living things?
Share your answers with a friend.

Living things are things that have life in them.

Non-living things are things that do not have life in them.

In this lesson, we will explore more about living things by learning about their life processes.

Activity 1.1

1. Go on a nature walk with your facilitator. Observe and identify various living things (human beings, animals and plants) and non-living things.
2. Look at the things living things can do that show that they have life in them.
3. Look at the things non-living things have in common that show that they do not have life in them.

Share your observation.

You would observe that:

Living things can move, they can eat, they can breathe, they can excrete and they can feel what happens around them. Non-living things on the other hand cannot do any of these things.

The things living things do that show that they have life in them are known as **life processes**.

The life processes of living things are:

1. Growth
2. Sensitivity to environment
3. Respiration
4. Excretion
5. Movement
6. Nutrition and
7. Reproduction.

Every living thing goes through these seven life processes.

In this lesson, we shall learn five of the life processes of living things. These are:

1. Growth
2. Sensitivity
3. Respiration
4. Excretion
5. Movement

1. Growth

All living things grow. Growth is the process by which living things increase in size. Look at the pictures below. What can you say about the cat and the maize plant?



Growth in animals and plants

Growth in plants begins with planting of a seed. When a seed is planted, it will first germinate and then grow into a young plant. The young plant grows gradually to become an adult plant. As plants grow old, their leaves become dry and brown.

Animals also grow and become bigger and taller. All animals including human beings grow to a certain age. As we grow old, we become weak and less active.



Growth in human beings

2. Sensitivity

Why do you wear heavy clothes when the weather is cold?

Why do you wear light clothes when the weather is hot?

We feel hot or cold because our body is able to detect if the weather is cold or hot.

Living things can sense what is going on around them and they respond to it.

This is known as **sensitivity**.



Sensitive to cold weather

Human beings and animals are able to detect changes in their environment using the five sense organs. The sense organs are the eyes, ears, nose, tongue and skin.

Human beings and animals use their eyes to see, their nose to smell, their tongue to taste, their ears to hear sounds and their skin to feel and detect whether something is cold or hot.



Sensitive to touch

Plants are also sensitive to their surrounding. Have you ever touched the leaves of a mimosa plant? The leaves of a mimosa plant close when you touch them? This shows that the mimosa plant is sensitive to touch.

Leaves open



Leaves close



Mimosa plant

Plants are also sensitive to light. On sunny days, plants such as the sunflower bends toward the direction sun.



Sunflower facing the sun

3. Respiration

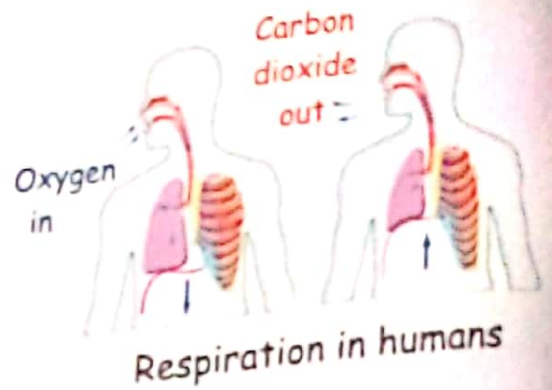
All living things go through a process that help them create the energy they need to live. This process is called **respiration**. Respiration involves the exchange of two special gases which are oxygen and carbon dioxide. Our body uses the oxygen in the air we breathe to create the energy we need to live. This kind of respiration happens in the cells of living things. It is called **cellular respiration**.

During respiration, human beings and animals take in oxygen and bring out carbon dioxide.

The part of our body system responsible for respiration is known as the **respiratory system**. The parts of the respiratory system include the; nose, nasal cavity, mouth, throat (pharynx), voice box (larynx), wind pipe (trachea), diaphragm, lungs, bronchi, bronchioles and alveoli.

Other animals carry out respiration in different ways. For example, insects

breathe through holes in their body called spiracles. Fishes take in oxygen from water using their gills. Amphibians such as the frog exchange gases through their skin when they are in water and through their lungs when they are on land.



Respiration in humans

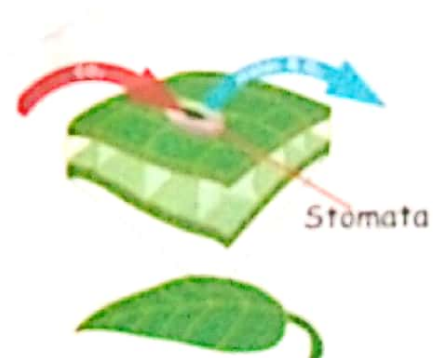


A fish uses its **gills** to breathe.

Plants also respire

Plants like other animals respire. Plants also need energy to carry out their life processes. How do plants respire?

Plants have tiny holes in their leaves that help them to respire. These holes are called **stomata**. Stomata help plants to breathe in carbon dioxide and breathe out oxygen.



How plant respire

4. Excretion

All living things excrete. Excretion is the process of **removing chemical waste substances** from the body.

Human beings and animals produce waste substances such as sweat, urine, faeces and carbon dioxide. We excrete carbon dioxide from our body because it is harmful to us. The excretory organs are responsible for the removal of waste substances from our body. These organs include the skin, the kidney and the lungs.



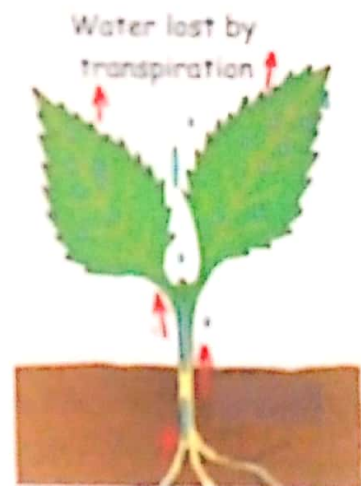
A man sweating



A boy defecating

- Sweat is a waste substance we remove through the skin.
- Urine is a waste substance we remove from the kidney.
- Faeces is a waste substance we remove from the intestine.
- Carbon dioxide is a waste substance we remove from the lungs.

Plants excrete excess water through their leaves by a process known as **transpiration**. Plants also remove excess oxygen through the stomata.



Which other waste substances do we excrete?
Discuss and share with the class.

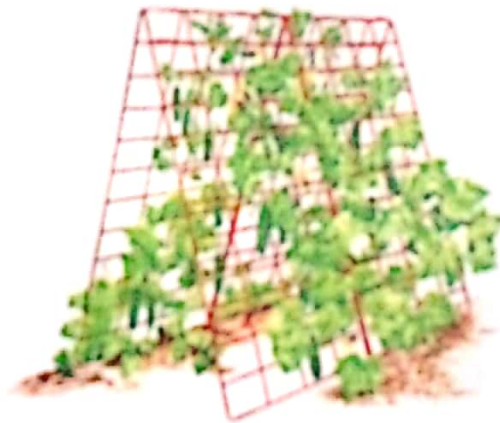
5. Movement

All living things move. Animals move from place to place. Animals show movement by walking, running, swimming, hopping, crawling, galloping and flying.



Movement in animals

Plants do not move around like animals. Plants show movement within their parts. As plants germinate, their shoots (stem, flowers and leaves) grow upward and the roots grow downward. Leaves and flowers move by turning toward the sun to receive sunlight. Climbing plants show movement by growing and climbing on things while creeping plants show movement by spreading on the ground.



Movement in plants

THINK-PAIR-SHARE

Discuss with your partner the importance of growth, sensitivity, respiration and excretion to living things.

ASSIGNMENT

Visit www.youtube.com and watch animated videos of different living things (For example; birds, insects, trees, reptiles and mammals).

Watch the various life processes in living things (growth, sensitivity to the environment, respiration and excretion). Report your findings.

PROJECT WORK

Plant any type of seed of your choice.

Water the seed till it germinates and begins to grow into a young plant.

Observe the growth process in the plant.

Record your observations and report your findings.

TEST YOUR UNDERSTANDING**PICTURE DESCRIPTION**

1. Study the pictures below carefully and describe the life process each living thing represents.



A



B



C

RIDDLE, RIDDLE!

2. Among all plants, I am described as the most sensitive plant. I am very open and because of that I have a lot of friends. Although I am open, my friends are very careful when playing with me. They call me 'the touch me not plant'. This is because when they touch me I quickly fall asleep.

WHO AM I?

1.1.2.1 DIFFERENCES AMONG THINGS THAT ARE LIVING, DEAD AND THINGS THAT HAVE NEVER BEEN ALIVE

Introduction

In our environment, we see a lot of things around us. We see things such as trees, tables, human beings, dogs and flowers. All these things can be categorised into

1. Things that are alive
2. Things that were once alive
3. Things that never lived

1. Things that are alive

If something is alive, it simply means that the thing is a living thing. For example plants, human beings and other animals are all things that are alive.



Some examples of things that are alive

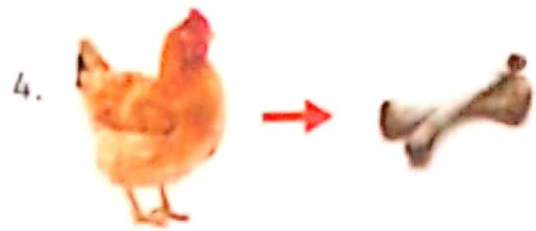
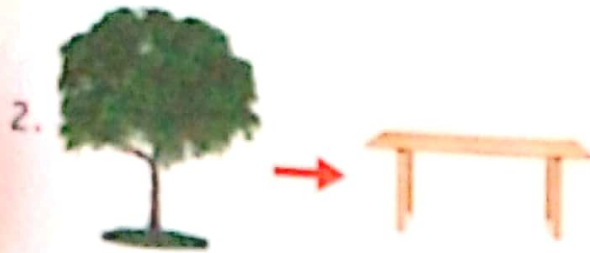
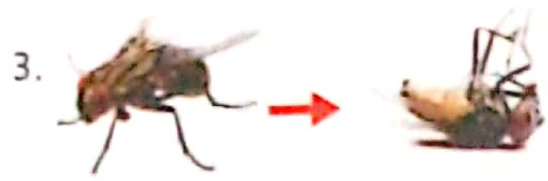
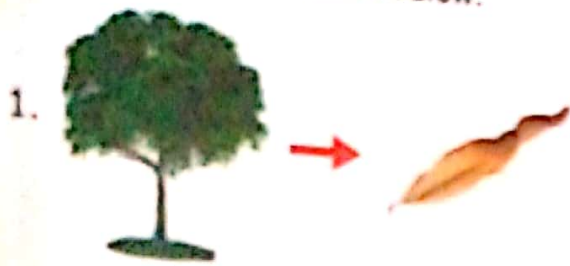
2. Things once alive

When we say things once alive, it simply refers to things that **used to be** alive but are no more living. Dried leaves, dead animals, firewood, tables and bones are all examples of things that were once alive or things that once lived.



Some examples of things that were once alive

Look at the illustrations below.



1. The dry leaf was once part of the tree. The dry leaf was once alive.
2. The wood used to make the table was gotten from the tree. The tree was once a living thing before it was cut down to make the table.
3. The dead housefly was once a living thing before it died.
4. The bones were once part of the hen until the hen was killed, fried and eaten. Therefore the bones were once alive.

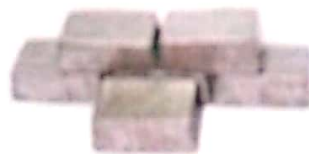
Can you give some other examples of things that were once alive?

3. Things that have never been alive

Things that have never been alive refer to things **that have never lived**. Some examples of things that have never been alive are metals, plastics, stones, rocks, soil and water.



Stones



Metals



Plastics



Soil

Some examples of things that have never been alive

Activity 1.2 Differences among things that are living, things once alive (dead), and things that have never been alive**What to do**

1. Go on a nature walk with your facilitator and assemble living things (For example; plants and insects), non- living things (For example; firewood, pencils and paper) and things that have never lived (rocks, soil and water).

Caution: Wear protective (hand glove and nose mask) when gathering specimen.

2. Observe and comment on what you have assembled.
3. Classify all the things you have collected in a table form as shown below.

Alive	Once alive	Never been alive

Explain the differences among the things that are alive, were once alive and have never been alive.

TEST YOUR UNDERSTANDING

CRITICAL THINKING

1. This morning as Korkor was sweeping the school compound, she swept a lot of dry leaves under the big mango tree.

The dry leaves Korkor swept are

- (a) things that are alive
- (b) things once alive
- (c) things that have never been alive.

- Explain your answer

2. All living things need water to stay alive.

Water is/ was/ has A. alive B. once alive C. never been alive

Give reasons for your answer.

3. Look at the pictures below carefully.

Describe what each picture represents; that is, things that are alive, things that once lived or things that have never lived.



A



B



C



D



E



F



Key points to remember

1. **Life processes of living things** are the things living things can do that show that they are alive or they have life in them.
2. All living things respire to stay alive.
3. Animals take in oxygen and bring out carbon dioxide.
4. Plants breathe in carbon dioxide and bring out oxygen
5. Excretion is the process of removing chemical waste substances from the body.
6. Everything around us in our environment are things that are alive, things that were once alive and things that never lived.

SUB-STRAND 2: MATERIALS

By the end of this sub-strand, the learner will:

CONTENT STANDARDS	INDICATORS
B5.1.2.1 Recognise materials as important resources for providing human needs.	B5.1.2.1.1 Classify everyday materials based on their properties (soft, hard, rough, smooth, opaque, transparent and bendable).
B5.1.2.2 Know that substances can exist in different physical states (solid, liquid, gas). Many substances can be changed from one state to another by heating or cooling.	B5.1.2.2.1 Know that some changes are reversible, while others cannot be reversed.
B5.1.2.3 Understand mixtures, the types, formation, uses and ways of separating them into their components.	B5.1.2.3.1 Demonstrate formation and separation of mixtures (solid-liquid and liquid-liquid mixtures).

SUB-STRAND
2

MATERIALS

1.2.1.1 CLASSIFICATION OF MATERIALS BASED ON THEIR COMMON PROPERTIES

Keywords

Materials	Appearance	Properties	Bendable
Similarities	Transparent	Opaque	Classification

Introduction

When we look around our environment, we see different kinds of objects with different colours, shapes, sizes and appearances. All the objects we see around us are made from different materials.

A material is any substance from which an object can be made from. Some examples of materials are cotton wool, fabrics, wood, plastics, leather, glass, rocks, metals and soil samples.



Some objects and the materials they are made from

Materials are used to make different kinds of things for human use. Dresses, bags, pencils, books, chalk, straw, tables, mirror, plastic bottles, pots, saucepans and computers are some objects that are made from different materials.

In this lesson, we shall learn how to classify materials based on their common properties.

Activity: 2.1 Grouping materials based on their properties (soft, hard, rough, smooth, opaque, transparent, and bendable)

Work in groups. Classify different materials based on their similarities and differences.

Caution: Should be done under the supervision of your facilitator.

1. Collect a variety of everyday materials from your home, school and community. Items to collect should include cotton wool, piece of cloths, wood, pieces of paper, cardboard, plastics, soil samples (clay), chalk, crayon, pen, polythene bags (coloured and transparent), marbles (rough and smooth) and straws.
2. In groups of three (**A, B and C**).
 - Group A** - sort the materials based on texture (hard, soft, rough or smooth).
 - Group B** - sort the materials into those that we can see through them (transparent) and those that we cannot see through them (opaque).
 - Group C** - sort the materials into those that can bend, and those that cannot bend.
3. Each group should put their sorting in a table form for class discussion.

GROUP A

Rough	Soft	Hard	Smooth

GROUP B

Transparent	Opaque

GROUP C

Bendable	Cannot Bend

From the activity, you will observe that;
All materials have different textures. Some are hard, soft, smooth or rough.
Some can bend and some cannot bend.
Some are transparent and some are opaque.

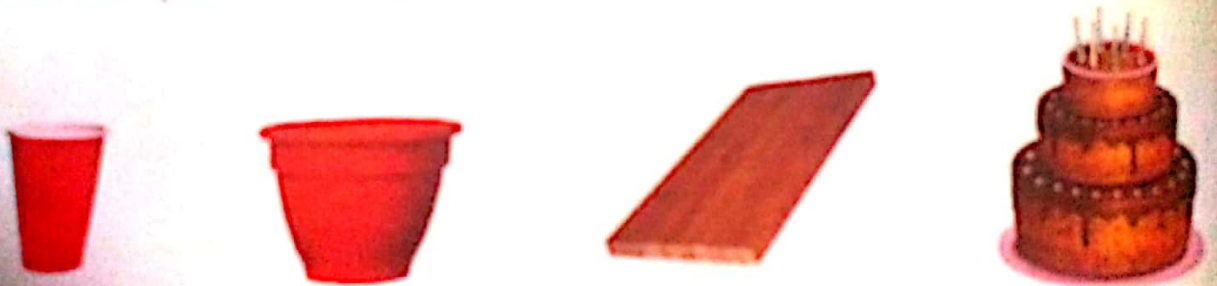
What are transparent and opaque materials?

Transparent materials are materials that we can see through them easily.
For example plain glasses and plain polythene bags.



Some examples of transparent materials

Opaque materials are materials that we cannot see through them.
Some examples are flower pot, wood and cardboard box.

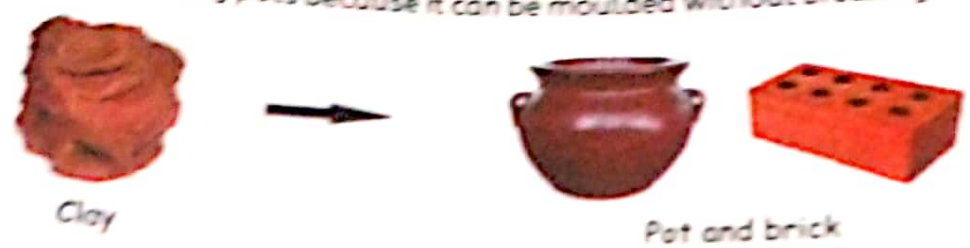


Some examples of opaque materials

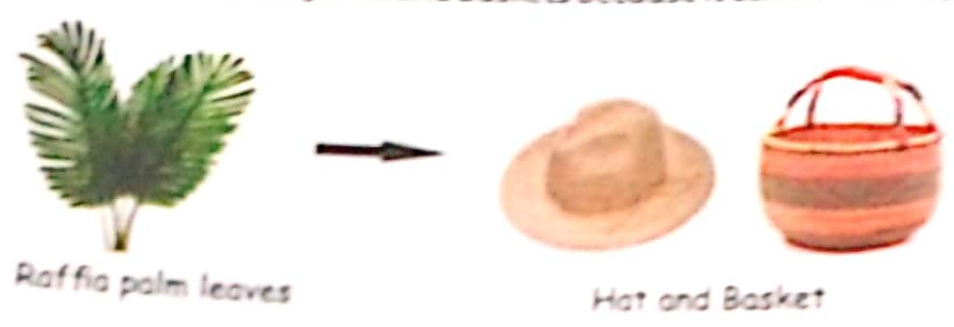
Properties of materials

Properties of a material are the qualities that allow a material to be used to make certain products. For example;

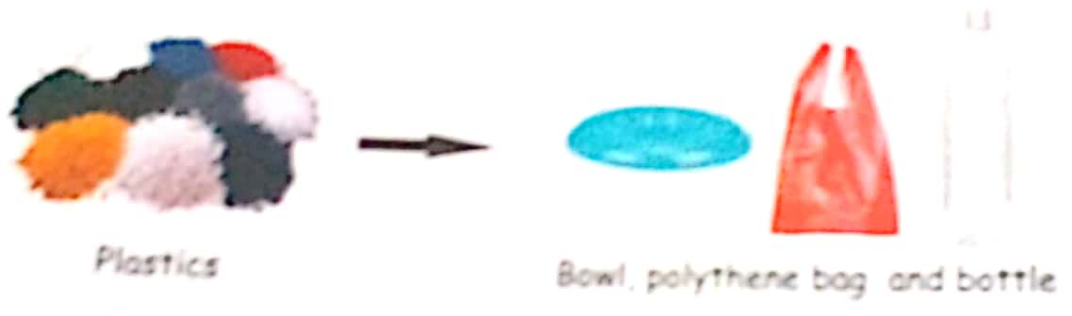
- Clay is used for making pots because it can be moulded without breaking.



- Raffia palm is used for making hats and baskets because it can bend easily.



- Plastics are used for making plastic bottles, bowls, plates and spoons because plastics can easily be melted and formed into different shapes.



- Metals are used to make cooking saucepans and cutlery. Though metals are very hard, they easily get heated up when they are put on fire. This is why we use saucepans for cooking.



Project:

Use different materials to create new items such as paper fans, toy cars, toy planes, cooking pans, hats, earthenware, pots and bowls.

TEST YOUR UNDERSTANDING**PICTURE DESCRIPTION**

1. Look at these items carefully. Mention the materials they are made from and give reasons why they are made from those materials.



A



B



C



D



E



F

BOOST YOUR THINKING SKILL - RIDDLE, RIDDLE!

- We are materials found in the environment. We are used to make products like plain polythene bags and plain glasses because we have nothing to hide. We are very transparent in whatever we do. **WHO ARE WE?**
- We are materials found in the environment. No matter what you do to us, you can never see through us. **WHO ARE WE?**
Give some examples of us.

1.2.2.1 REVERSIBLE AND IRREVERSIBLE CHANGES

Keywords

Reversible	Irreversible	Substance	Original
Melting	Freezing	Appearance	

Introduction

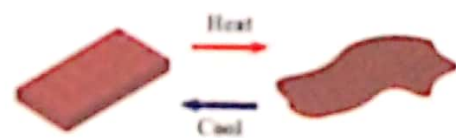
A change in a substance occurs when a substance either gains heat or loses heat. The changes substances go through can be put into two groups. These are **reversible change** and **irreversible change**.

Reversible change

Any change that occurs and can be changed back to its original state with no new substance forming is known as a **reversible change**. In other words, a change where no new substance is formed is known as a **reversible change**. In a reversible change, though the appearance of the material may look different, it will not produce any new material. Some examples of reversible changes are:

1. Melting

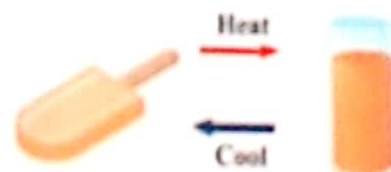
A bar of chocolate can be melted into liquid by heating and changed back into solid chocolate by cooling. Though the appearance of the chocolate changed after it was melted, no new substance was formed. The melted chocolate changed back to solid chocolate when it was cooled.



Melting of chocolate

2. Freezing

We can heat orange ice lollies to become orange juice. The orange juice can be changed back into an ice lolly by cooling it and the substance will still remain the same.



Freezing of orange juice

Other examples of reversible changes are:

1.



Melting of candle wax

2.



Crumpling of paper

3.



Grinding of chalk

4.



Melting of shea butter

5.



Heating of water

6.



Freezing of water

Activity 2.2

To show that no new substance is formed when we freeze water

What to do

1. Place a bottle of water in a freezer.
2. Leave the bottle in the freezer for about six hours and observe what happens. Did the water change to ice?
3. Bring out the bottle from the freezer and allow it to stand for sometime.
4. Observe what happens after an hour.

Has the ice melted back to liquid water?

Observation

After sometime, you will observe that the ice in the bottle is melting back to water.



Conclusion

We can conclude that water is a substance that can change to ice by freezing and change back to water by melting with no new substance forming. Therefore the change that occurs in water is a reversible change.

Group activity

Undertake the following activities in groups. (For example, melting of candle wax, melting of ice, melting of shea butter, heating of water and crumpling of paper). Discuss your observation.

Irreversible change

Irreversible change is a change in which **a new thing is always formed**.

What this means is that any time a substance goes through a change, a new substance is formed and the new substance cannot be reversed to its original appearance. For example, when you burn a piece of paper, the paper will turn into ashes. The ashes cannot be changed back to paper again. This makes burning of paper an irreversible change. Some other examples of irreversible change are rusting of iron, burning of charcoal and boiling or frying of egg.



Burning of paper



Rusting of iron nails



Burning of charcoal



Boiling or frying of egg

Activity 2.3 To show that a new substance is formed when iron is rusted

Materials needed: New iron nails.

Steps to follow

1. In groups, collect some new iron nails and examine their surfaces.
2. Record your observation.
3. Put the iron nails in an open safe place for some weeks.



Observation

You will observe that the appearance of the iron nails have completely changed. The appearance of the nails are no more shiny, they have rusted. Rusted nails cannot be reversed to new nails.

Discussion

The rust formed on the nails has brought about a change in the appearance of the nails.

We can therefore conclude that the change that has occurred is an irreversible change.



GROUP ACTIVITY

Undertake the following activities in groups.

Caution: This should be done under the supervision of your facilitator.

Burning of paper, piece of bread chewed in the mouth for 5 minutes, an egg boiled for 5 minutes. Discuss your observation.

TEST YOUR UNDERSTANDING

PICTURE DESCRIPTION

1. Write short notes on reversible and irreversible changes.
2. Study the pictures below carefully and state which of them represent reversible and irreversible changes.



Evaporation of water



Condensation of water



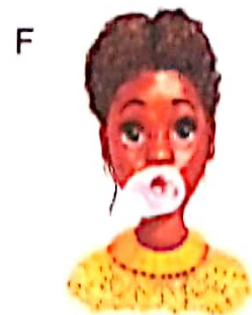
Burning of firewood



Roasted groundnut



Tea



Chewing of gum

CLASS DEBATE

Debate on whether an unclean school environment is a reversible change or an irreversible change.



Unclean classroom

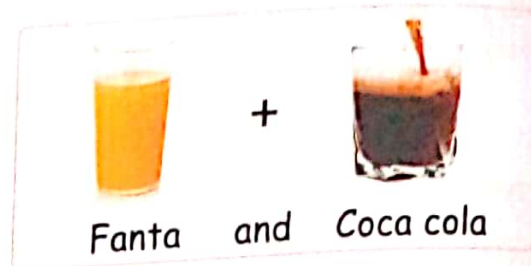
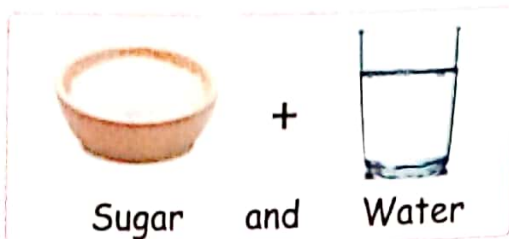
1.2.3.1 FORMATION AND SEPARATION OF MIXTURES

Keywords

Formation Separation Mixtures Filtration Evaporate
Filter Solution Dissolve Miscible Immiscible Funnel

Introduction

Observe the substances below.



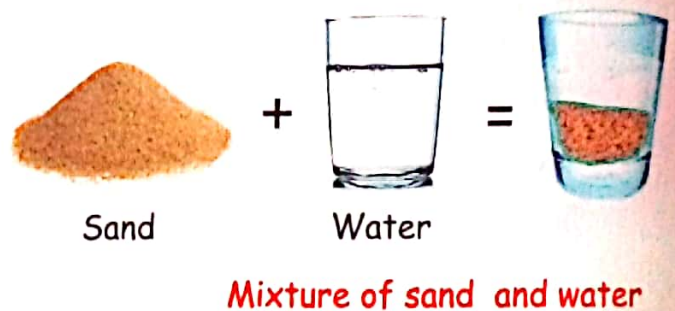
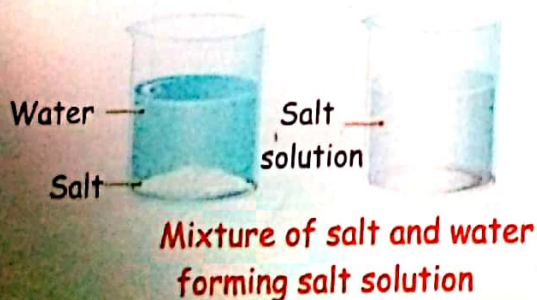
When you **put, combine or mix two or more substances** together you have formed a mixture. There are different types of mixtures that can be formed.

Some examples of these mixtures are:

1. Solid-liquid mixtures
- and 2. Liquid-liquid mixtures.

I. Solid-liquid mixtures

Solid-liquid mixtures are mixtures that can be formed by combining solid and liquid substances only. Some examples of solid-liquid mixtures are salt and water, sand and water, and chalk particles in water.



A solution is formed when solid particles completely dissolve when mixed with liquid.

Separation of solid-liquid mixtures

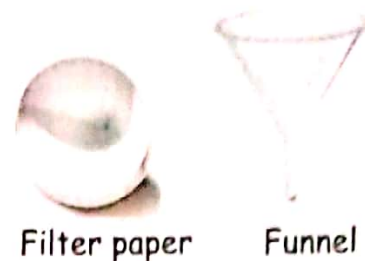
There are three methods that can be used to separate solid-liquid mixtures.

These are 1. Filtration 2. Evaporation and 3. Sieving

1. Filtration

Filtration is the method used to remove solid particles in liquid.

To separate solid particles in liquid, you will need two main items. These are **filter paper and funnel**.



Filter paper

Funnel

How filtration is done

Activity 2.4

To separate sand and water

Apparatus: Conical flask, funnel, filter paper and glass rod.

Caution

The activity should be done under the supervision of your facilitator.

What to do

1. The apparatus are arranged as shown in the picture.
2. Fold a filter paper and gently place it in the funnel.
3. Mix an amount of sand and water gently with the help of a glass rod.
4. Pour the mixture into the funnel.

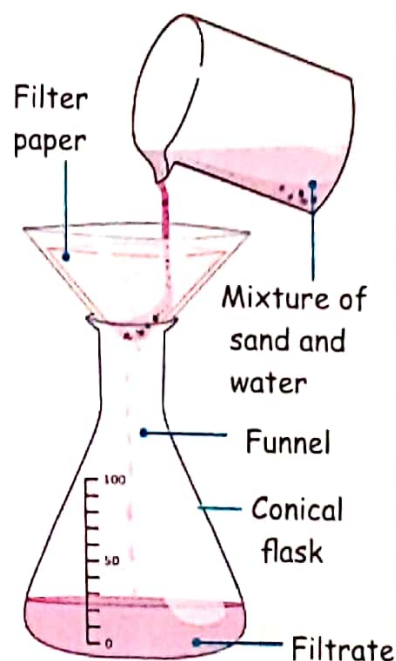
Observation

The water passes through the filter paper leaving the sand particles on the filter paper.

The sand particles that remain on the filter paper is known as **residue**.

Conclusion

A clear water (filtrate) is collected in the conical flask and the sand (residue) remains in the funnel.



2. Evaporation

Evaporation is a process by which liquid changes to gas (vapour). Evaporation is used to separate solid substances that easily dissolve in liquid.

For example, evaporation method can be used to separate a mixture of salt and water (salt solution).



Evaporation of water

How to separate a mixture of salt and water

Activity 2.5 How salt can be separated from water

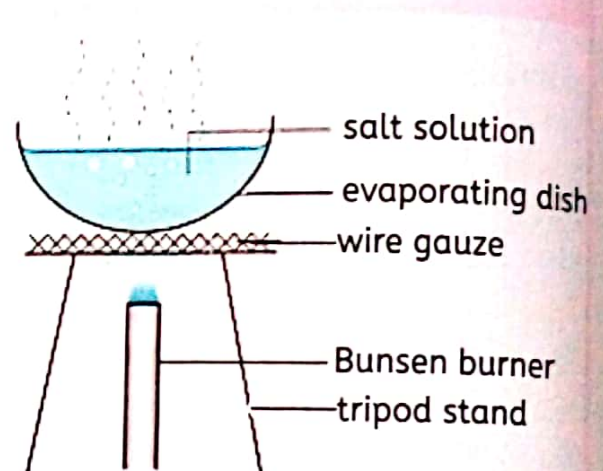
Materials needed: salt solution, tripod stand, wire gauze, Bunsen burner and evaporating dish

Caution

The activity should be done under the supervision of your facilitator.

Procedure

1. Arrange the set up as shown in the diagram.
2. Pour the salt solution into the evaporating dish.
3. Heat the mixture gently.
As the mixture boils, the water begins to evaporate leaving behind the salt.



Observation and Conclusion

You will begin to see the salt as the water evaporates.

GROUP WORK

The pictures below show the steps used in separating a mixture of salt and sand.

In groups perform an activity to describe how this process of separation is carried out.



Salt and sand mixture



1



2



3

3. Sieving

Sieving is a method used to separate solid-liquid mixtures using a sieve.

Have you ever observed how your mother separates palm juice from its chaff anytime she is preparing palm nut soup?

Can you describe the process she uses in separating the palm juice from its chaff?

Look at the pictures below and describe how the process of separating palm juice from its chaff is carried out.



A sieve



When a cooked palm nut is pounded, it is mixed with hot or warm water. The mixture is then poured into a sieve to allow the juice to drain leaving the palm nut chaff behind.

This method of separation is known as **sieving**.

- Corn dough and cassava dough mixed with water can also be described as a solid-liquid mixture. In order to have a smooth banku, you have to sieve the mixture to drain out all the liquid leaving the chaff in the sieve.



Mixture of corn and cassava dough

Activity 2.6 How to separate solid-liquid mixtures

Things needed: A sieve, mixture of sand and water, corn dough and water, pounded palm nut and water, chopped okra and water.

What to do

Caution: Perform this activity under the supervision of your facilitator. In groups, separate the following solid-liquid mixtures using the sieve.

Group 1 (G1) - separate sand and water mixture.

Group 2 (G2) - separate corn dough and water mixture.

Group 3 (G3) - separate pounded palm nut and water mixture.

Group 4 (G4) - separate chopped okra and water mixture.

Class discussion

Each group should discuss how they separated the various mixtures using the sieve.

Group discussion

1. Discuss some solid-liquid mixtures your mother separates using a sieve.
2. Describe how she separates the mixtures.

RESEARCH ASSIGNMENT

The preparation of the popular local drink, 'sobolo', goes through several processes before the final drink is bottled for sale.

Visit www.youtube.com and observe the various steps involved in preparing 'sobolo' drink.

Describe what method of separation is used to separate the liquid before the 'sobolo' drink is finally bottled for sale.

Liquid-liquid mixtures

Observe the following types of liquids: water, kerosene, cooking oil, milk and soft drinks.



Water



Kerosene



Cooking oil



Milk



Soft drinks

When two or more of these liquids are put together they form a mixture. This form of mixture is called **liquid-liquid mixture**.

Formation of liquid-liquid mixtures

When you mix two or more liquids together, you have formed a liquid-liquid mixture.

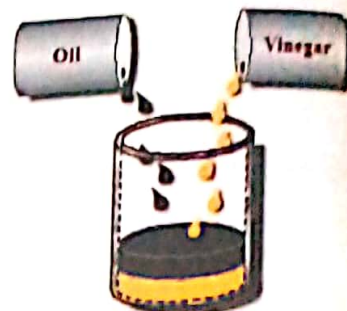
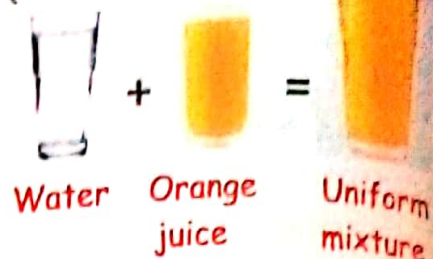
There are some liquids that form a uniform mixture when mixed together. Such liquids are called **miscible liquids**.

For example, water and orange juice are miscible liquids that form a **uniform mixture** when mixed together.

There are some liquids that do not form a uniform mixture when they are mixed together. Such liquids are called **immiscible liquids**.

Oil and vinegar are immiscible liquids that form a **non-uniform mixture** when mixed together.

(Miscible liquids)



Non-uniform mixture

Separation of liquid-liquid mixtures

Let us investigate how a mixture of immiscible liquids such as cooking oil and water can be separated.

This activity can be performed using a separating funnel.

What is a separating funnel?

A separating funnel is an apparatus used to separate two immiscible liquids of which one is heavier than the other.

When two liquids are mixed together, the lighter liquid always settles on top of the heavier liquid. For example, in a mixture of oil and water, the oil will settle on top of the water because the oil is lighter than the water.



Separating funnel

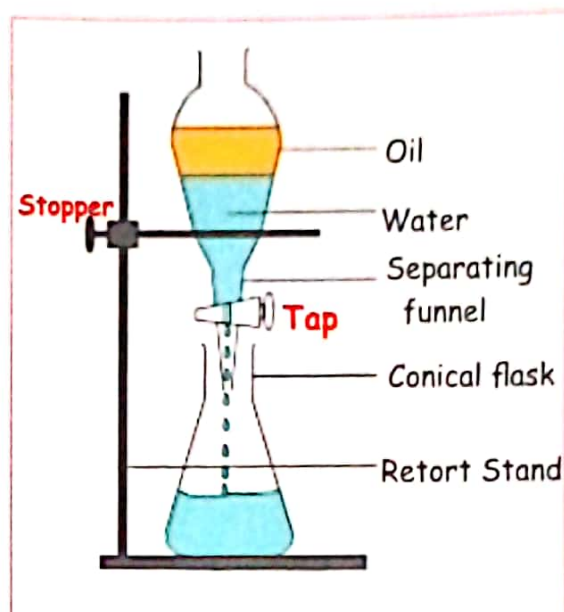
Activity 2.7**How to separate a mixture of water and oil using a separating funnel**

Materials needed: Separating funnel, conical flask, water, vegetable oil or palm oil, retort stand and clamp

What to do

Caution: The activity should be done under the supervision of your facilitator.

1. Mix some water and cooking oil together. Did the two liquids mix uniformly? Which of these liquids is heavier?
2. Pour the mixture into the separating funnel. Before pouring the mixture make sure the tap of the funnel is firmly closed.
4. Cork the separating funnel using the stopper.
5. Open the tap and let the water flow out. The moment a drop of oil drops from the tap means all the water has flown out and as such the mixture is separated.

**Observation and conclusion**

Water and oil are immiscible liquids that form a non-uniform mixture when they are mixed together.

The cooking oil floats on top of the water because the water is heavier than the oil.

We can therefore say that water and oil mixture can be separated using the separating funnel.

Project: Separation of solid-liquid mixtures

Separate a mixture of sand and water using appropriate materials.

NOTE: You can also use improvised separation equipment to effectively separate various solid-liquid mixtures.

TEST YOUR UNDERSTANDING**APPLY YOUR KNOWLEDGE**

A. Which methods and laboratory instruments will you use to separate the following mixtures?

1. Salt and water solution
2. Vinegar and palm oil mixture
3. Palm nut and water mixture

Draw the instrument you will use for various separations in questions 2 and 3.

B. Ben needs some oil to grease one of the tools in his school science laboratory. The only oil Ben found in the science lab has already been mixed with water. Ben asked his facilitator, Mr. Asare, if he could separate the water and oil mixture in order to get oil to grease the tool.

1. What type of mixture did Ben find in the container?
2. What is the name given to the liquids that form this mixture?
3. Why are the liquids in the container formed in two layers?
4. Describe how Ben will separate the two liquids.



Container filled with water and oil mixture



Key points to remember

1. The properties of a given material enables it to be used for making certain products. For example clay is used for making pots because it can be moulded without breaking.
2. **Reversible change** is a change in which no new substance is formed.
3. **Irreversible change** is a change in which a new substance is always formed.
4. When you put or combine two or more substances together you have formed **a mixture**.
5. There are mixtures that can be formed by combining solid and liquid substances together. Such mixtures are called **solid-liquid mixtures**.
6. There are mixtures that can be formed by combining liquid substances together. Such mixtures are called **liquid-liquid mixtures**.

STRAND 2**CYCLES**

SUB-STRAND 1: EARTH SCIENCE

SUB-STRAND 2: LIFE CYCLES OF ORGANISMS

SUB-STRAND 1: EARTH SCIENCE**By the end of this sub-strand, the learner will:**

CONTENT STANDARDS	INDICATORS
B5.2.1.1 Recognise that some events in our environment occur recurrently.	B5.2.1.1.1 Know how day and night are formed.
B5.2.1.2 Recognise the relationship between the earth and the sun.	B5.2.1.2.1 Describe the benefits of the sun to the earth.
B5.2.1.3 Show understanding of the roles of condensation, evaporation, transpiration and precipitation in the hydrological (water) cycle	B5.2.1.3.1 Demonstrate evaporation and condensation as important processes of the hydrological (water) cycle. B5.2.1.3.2 Know how clouds are formed.
B5.2.1.4 Demonstrate understanding of how carbon and nitrogen are cycled in nature	B5.2.1.4.1 Describe the uses of carbon dioxide and its effects on humans and life on earth.
B5.2.1.5 Recognise water and air as important natural resources.	B5.2.1.5.1 Identify human activities that make water unsuitable for human use. B5.2.1.5.2 Know how to make and keep air clean in our environment.

**SUB-STRAND
1****EARTH SCIENCE****2.1.1.1 KNOW HOW DAY AND NIGHT ARE FORMED****Keywords**

Sunset

Sunrise

Solar system

Rotation

Axis

Introduction

When we wake up in the morning, we see the sun rising up in the sky. The sun shines throughout the day and every place becomes bright.

During this time, children like you go to school and also go out to play. Workers also go to their various workplaces to work. We call this **day time**.

As the day goes by, the sunshine begins to reduce gradually until the sun can no longer be seen in the sky. When this happens, we say **the sun has set**.

When the sun sets, we enter evening time. Darkness begins to spread all over the earth. During evening time, every place becomes dark and we cannot see clearly.



Sunrise (Day time)



Sunset (Night time)

How does rotation occur?

We learnt in our previous lessons that the position of the sun is fixed. This means that the sun does not move. It is the planets and other objects in the solar system that move round the sun.

The planet earth on which we live turns round on its **axis**. An axis is an imaginary line on which an object turns. At the playground, there are various objects that turn round on their axis. For example, a football and a merry-go-round.

When the earth fully turns once, we call it **1 day**. It takes the earth 24 hours to make one complete turn on its axis.

The turning of the earth on its axis is known as **rotation**.

Rotation of the earth on its axis



What causes day and night?

The **rotation** of the earth is what causes **day and night**.

As the earth turns slowly on its axis, part of the earth faces the sun. The light from the sun rays only falls on the part of the earth that faces the sun. This part of the earth experiences the brightness of the sunlight which causes day. The other half of the earth that is away from the sun experiences total darkness which is night time.

This is how the rotation of the earth causes day and night.



How rotation of the earth causes day and night

Do you now understand why it can be day time in Ghana but night time in America at the same time? This is because day and night occur as the earth turns on its axis.

Let us perform this activity to show how day and night occur.

Activity 1.1

To show how day and night occur

Things needed

A globe, a torch light or fix a bulb, a colour pencil and a dark room.

What to do:

Perform this activity under the supervision of your facilitator.

1. Place the globe on a table.
2. Mark one side of the globe 'A'.
3. Mark the other side 'B'.
4. Fix the torch light at one point to face the globe.
5. Turn off the light in the room to make the room dark.
6. Turn on the torch light and throw the light on the side of the globe marked A.
7. Now, turn the globe round slowly. Let the part marked B face the torch light and the other part marked A face the other side.



How day and night occur

What can you say about the two sides of the globe marked A and B?
Which part of the globe is bright and which part is dark?

Observation and conclusion

You will observe that as the torch light falls on the side of the globe marked A, that part becomes bright and the side marked B remains dark. However, when side A is turned away from the torch light, the side marked B becomes bright and the side marked A becomes dark.

The part where there is light represents day time and the part where there is no light represents night time.

The globe represents the earth and the torch light represents the sun.

The turning of the globe round slowly represents the turning of the earth on its axis. The side facing the light represents day and the dark part away from the light represents night.

We can therefore say that the rotation of the earth causes day and night.

PROJECT

Visit www.youtube.com and do further research on the following:

- How rotation of the earth occurs.
- How rotation of the earth causes day and night.

Based on the research, use any material of your choice to mould a model of how rotation of the earth causes day and night.

Give a brief presentation on your model in class.

TEST YOUR UNDERSTANDING**CRITICAL THINKING**

You travelled to the United States of America (USA) with your Dad and your younger sister. You took off from Kotoka International Airport in the night and arrived in USA the next day in the afternoon.

You decided to call your mum to tell her you had arrived safely. Although your mum answered the call, she told you it was very late and she was already in bed. Your younger sister did not understand why it was day time in USA but night time in Ghana.

1. Explain to your sister how it can be day time in USA but night time in Ghana at the same time.
2. Draw and colour a diagram to support your explanation.

2.1.2.1 BENEFITS OF THE SUN TO THE EARTH

Keywords
Sunlight Photosynthesis Vitamin D Energy Solar energy

Introduction

Energy from the sun is very important to us on earth. In this lesson, we shall learn about the benefits the earth derives from the sun.

Think-Pair-Share

Pair up with the person sitting next to you and discuss the following:

1. What benefits does the earth derive from the sun?
2. Assuming there was no sun, what do you think will happen to the earth? Share your thoughts with the class.

Some of the benefits of the sun to the earth are:

1. The sun gives us light throughout the day. It also provides us with warmth. Without heat from the sun, the surface of the earth will be very cold.
2. Sunlight provides energy needed by plants to make their own food through a process called **photosynthesis**.
3. Sunlight provides our body with Vitamin D. When vitamin D is absorbed through the skin it gives us calcium. Calcium is needed by our body for strong bones and teeth.
4. Farmers use heat energy from the sun to dry farm produce such as maize, millet, wheat and beans.
5. Heat from the sun helps our clothes to dry after washing them.
6. Solar energy from the sun is used to generate electricity using solar panels.

PROJECT

Investigate the importance of sunlight to the growth of plants.

This project can be done by planting maize seeds in two different pots.

- One pot should be kept in an area where there is sunlight and the other pot can be kept in a cupboard or an area with little or no sunlight.
- Observe the growth of both seeds for two weeks.

GROUP DISCUSSION

Use the pictures below to explain the benefits of the sun to the earth.



A



B



C



D

TEST YOUR UNDERSTANDING

BRAINSTORM

1. Look at the two pictures below carefully and give reasons why plants **A** are growing better than plants **B**.



A



B

2. The pictures below show the teeth of two children. Give reasons why the child in picture **A** has strong and healthy teeth while the child in picture **B** has decayed teeth.



A



B

2.1.3.1 IMPORTANT PROCESSES OF WATER CYCLE

Keywords

Water cycle Hydrological Evaporation Condensation Precipitation

Introduction

Have you ever wondered what causes rain to fall?

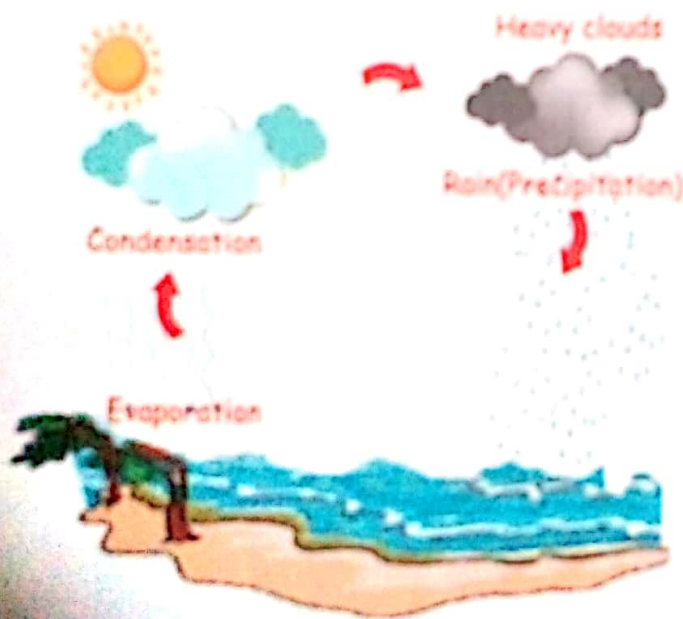
Well, water goes through a cycle before it falls on the surface of the earth as rain.

This cycle is termed as **hydrological (water) cycle**.

In the water cycle, there are two main processes water goes through before it falls on the surface of the earth as rain.

These processes are **evaporation** and **condensation**.

Look at the picture below. It shows how rain is formed through the water cycle process.



Hydrological (Water) Cycle

POEM

WHAT GOES ROUND AND
ROUND AND ROUND?

The water cycle goes round
and round and round

Water gets heated up by the
SUN and RISES into the sky

- Evaporation

Water vapour in the sky gets
COLD and forms CLOUDS

- Condensation

Water DROPLETS in the
clouds fall BACK down as
RAIN (Precipitation)

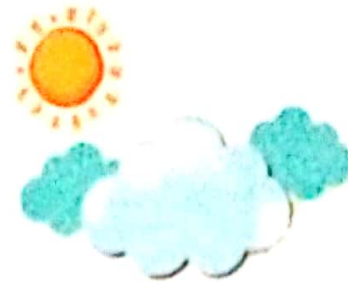
Water cycle goes round and
round all over the earth.

1. Evaporation

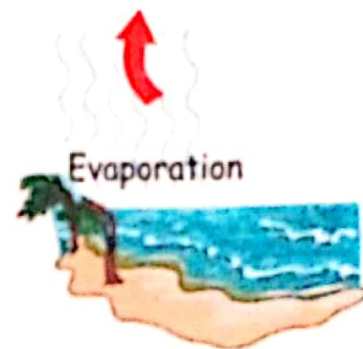
When the sun shines, it heats up water bodies such as lakes, rivers, lagoons and the sea.

When these water bodies get heated up by the sun, some of the water on their surfaces rise into the sky as water vapour (gas). This process is called **evaporation**.

Evaporation is the process where water (liquid) changes to water vapour (gas) by heating.



Condensation



Evaporation

2. Condensation

When the water vapour gets into the sky, it cools and changes back to tiny water droplets (liquid). The tiny water droplets come together and join to form clouds. This process is known as **condensation**.

Condensation is the process by which water vapour turns into water droplets by cooling.

RAIN

When the water droplets in the clouds get very cool in the sky, they become heavy. When they are too heavy, the clouds are not able to hold them anymore and they fall down as **rain**. Rain is also known as **precipitation**.

Heavy clouds



Rain(Precipitation)

Let us perform an activity to demonstrate how evaporation and condensation lead to the formation of rain.

Activity 1.2 To show how evaporation and condensation lead to the formation of rain

Materials needed: A beaker and a lid (cover), water and a source of heat (burner)

Steps to follow

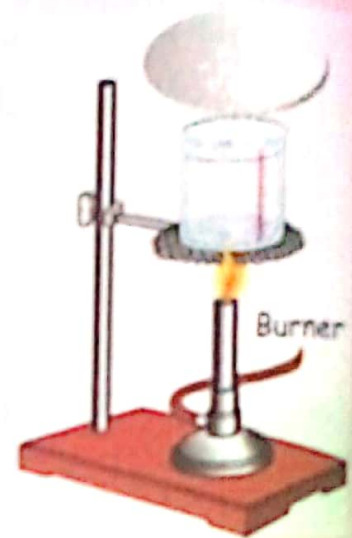
Caution: This activity should be done under the supervision of your facilitator.

1. Pour water into the beaker about a half full.
2. Heat the water till it boils.
 - Is water vapour rising from the boiling water?

The water vapour rising from the boiling water shows that **evaporation** is taking place.

3. Now, turn the heat off and cover the water with the lid. After a few minutes lift the lid and observe what happens.

- Has water droplets formed on the lid?



Observation

You will observe that the water vapour cooled on the surface of the lid and turned into water droplets.

The water droplets on the lid show that water vapour from the boiling water has cooled to become tiny water droplets. This is called **condensation**.

Discussion

In the water cycle, the lid represents the clouds and the fire represents the sun.

The water vapour that rises up as you heat the water shows how **water vapour rises up from water bodies when heated up by the sun**. This is how **evaporation** occurs.

When the water vapour gets unto the lid, it cools and changes into water droplets. **In the water cycle, water vapour cools in the sky and changes into water droplets which form clouds.** This is how **condensation** takes place.

-What happened to the water droplets on the lid?

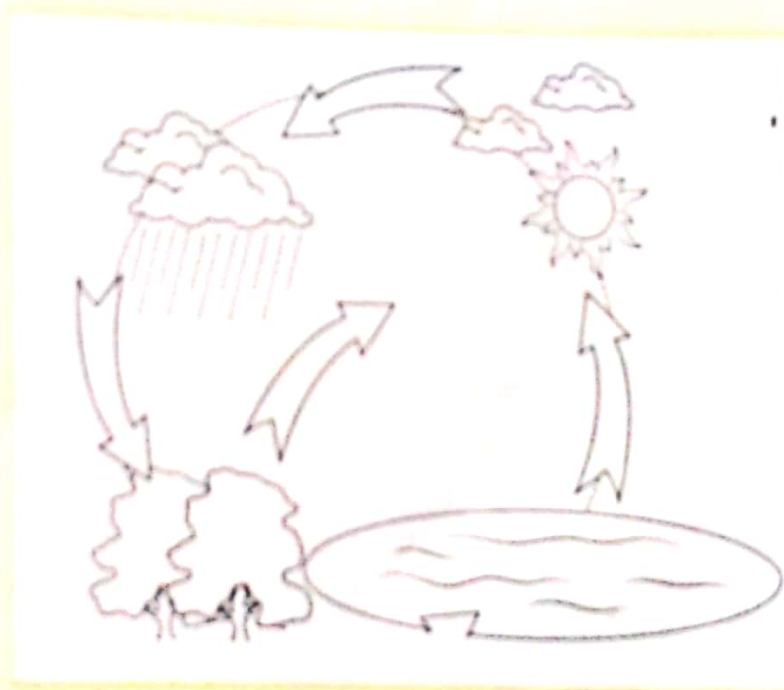
The water droplets dripped off to the ground when you lifted the lid.

This is the water that falls from the clouds to the ground as rain.

These are the processes water goes through to form RAIN. ☁️ 🌧️

TEST YOUR UNDERSTANDING

1. Identify the diagram below.
2. Draw, colour and label the diagram in your drawing book.
3. Describe the processes involved in the formation of rain as shown in the diagram below.



2.1.3.2 HOW CLOUDS ARE FORMED

Keywords

Clouds Water droplets Condensation Water vapour

Introduction

What are clouds?

We see clouds in the sky everyday.

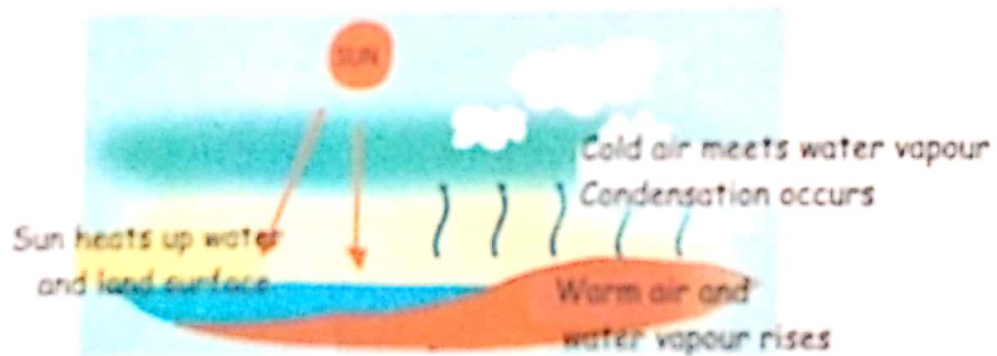
Clouds are made up of a **collection of very tiny water droplets**. Clouds float in the sky above us and even block out the sun sometimes. On some days, the clouds are white and puffy. On other days they are dark and they cover the entire sky.



How do clouds form in the sky?

Clouds form by a process called **condensation**.

Take a look at the diagram below. It shows how clouds are formed.



How clouds are formed

When the sun shines, it warms up the land and water bodies.

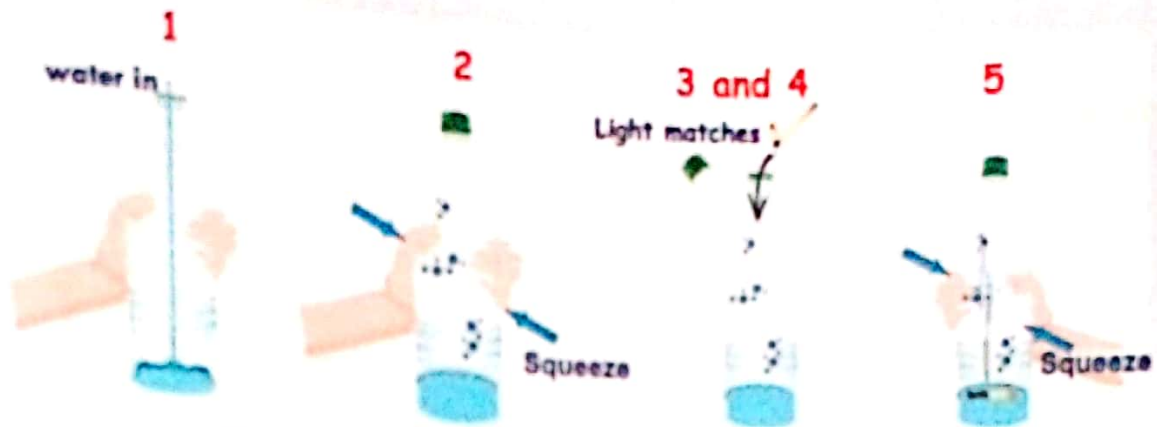
When water vapour from heated water bodies and warm air from the land rises upwards, they meet cold air in the atmosphere. The cold air in the atmosphere cools the water vapour to become water droplets. As more water droplets form in the atmosphere, they gather to form clouds.

The activity below demonstrates how clouds are formed using a bottle.

Activity 1.3 To demonstrate formation of clouds in a bottle

Things needed: Plastic water bottle with a cap, water, a box of matches.

Steps to follow



Note: This should be done under the supervision of your facilitator.

1. Pour a little amount of water into the plastic bottle.

2. Cover the bottle and squeeze it.

You will see bubbles moving upwards as you squeeze the bottle.

This explains how air moves in an upward vertical motion through the atmosphere.

3. Now, light the match and then blow it out so that it smokes.

4. Quickly drop the match into the bottle and cover it.

5. Squeeze the bottle gently for sometime and then release it.

6. Repeat step 5 several times.

What do you observe?

You will observe that as you release the bottle after squeezing it for sometime, smoke puffs form in the bottle. You have just made your own cloud!

2.1.4.1 USES OF CARBON DIOXIDE AND ITS EFFECTS ON HUMANS AND LIFE ON EARTH

Keywords

Carbon dioxide
Environment

Components
Photosynthesis

Atmosphere
Fossil fuel

Greenhouse gas
Fire extinguisher

Introduction

Think - pair - share

What are the components of air?

Air is all around us. All living things breathe in air to stay alive. The air around us is made up of different gases. These gases include oxygen, nitrogen, carbon dioxide and other gases. All animals including human beings take in oxygen which makes up 21% of the air. Plants breathe in carbon dioxide which makes up 0.04% of the air. About 78% of the air is made up of nitrogen.

In this lesson, we shall learn about one of the components of air which is **carbon dioxide**.

What is carbon dioxide?

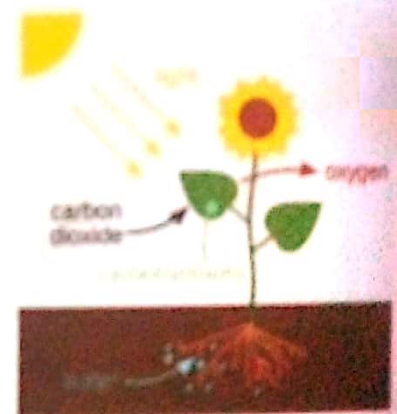
Carbon dioxide is a gas that is made up of both carbon and oxygen. Carbon dioxide is described as a greenhouse gas. Green house gases are gases that trap heat from the sun in the atmosphere. Without carbon dioxide and other greenhouse gases, the surface of the earth will be very cold.

How does carbon dioxide get into the environment?

Carbon dioxide gets into the atmosphere in so many ways. Some of these ways include:

1. Carbon dioxide gets into the atmosphere when human beings and animals excrete.

This is how it happens; Plants use sunlight and carbon dioxide to make their own food through a process known as **photosynthesis**. Through this process, carbon becomes part of plants.



As we eat plant produce such as fruits and vegetables, the carbon dioxide in the plants gets into our body.

During breathing, we bring out the carbon dioxide back into the atmosphere. We also bring out carbon dioxide gas through the anus as flatulence and out of the mouth as a burp.



Eating food

2. Another way in which carbon dioxide gets into the environment is when industries burn **fossil fuels**.

Fossil fuels are formed from dead plants and animals that have been buried in the ground for many years. Most industries burn these fossil fuels to produce different forms of energy such as the electricity we use at home.

When industries burn fossil fuels, the smoke that is released into the atmosphere contains large amounts of carbon dioxide.



Burning fossil fuel

3. Carbon dioxide can get into the atmosphere when cars release smoke from their exhaust pipes. Smoke contains carbon dioxide.



Smoke from cars

4. Burning of bushes and forests also release smoke into the environment.

Negative effects of carbon dioxide - (on the environment)

1. Carbon dioxide gas released into the environment pollutes the air by making it dirty and harmful.
2. Too much carbon dioxide released in the environment causes global warming. This means that it makes the surface of the earth become warmer than it is supposed to be. This affects the weather pattern and causes climate change.
3. Most animals lose their place of habitat and some even die when carbon dioxide is released during bush burning.

Negative effects of carbon dioxide - (on human health)

When we breathe in carbon dioxide (smoke), we are likely to suffer from headaches and also contract lung diseases such as cold, cough, asthma and lung cancer.

Uses of carbon dioxide

Although carbon dioxide affects us negatively, it can also be used to do many things.

1. Carbon dioxide is used in fire extinguishers to put off fire.
2. It is also used in making fizzy drinks and mineral water.
3. Plants use carbon dioxide and sunlight to prepare their own food through a process called photosynthesis.
4. Carbon dioxide gas is used to clean the surfaces of machines in electronic industries.
5. Carbon dioxide can also be used as a pesticide to kill pests.

CLASS DISCUSSION

Do you know that too much carbon dioxide in an overcrowded room can affect your health?

During the weekend, Ama visited her family home in the village. Ama and her cousins and some of their friends spent all the day chatting and laughing heartily in a small room that has no ventilation. In the evening Ama experienced severe headache and coughs.

1. Could the cause of Ama's headache and cough be as a result of too much carbon dioxide in the room? Discuss.
2. Briefly explain how too much carbon dioxide is produced in an overcrowded room.

TEST YOUR UNDERSTANDING**PICTURE DESCRIPTION**

Look at the pictures below carefully.

Use the pictures **only** to answer the questions that follow.



A



B



C



D

1. Explain how carbon dioxide gets into the environment.
2. What is the effect of carbon dioxide on human health?
3. Mention one effect of carbon dioxide on the environment.
4. State one use of carbon dioxide.

2.1.5.1 HUMAN ACTIVITIES THAT MAKE WATER UNSUITABLE FOR USE

Keywords

Unsuitable Quality Dangers Unsafe Sewage
Deforestation Toxic 'Galamsey' Illegal Pollute

Introduction

It is important to drink clean water to stay healthy. We get water from many sources such as river, lake, pond, stream, tap water, sea and dam. However, not all of these water sources are good for drinking.

Water becomes unsafe for use when it is polluted. We pollute water bodies through certain human activities.

How will you know if water is safe for drinking?

Group discussion

In groups discuss what a good drinking water is.

Discuss the qualities of good drinking water and present your findings to the class.

Good drinking water is water that is clean and free from germs.

Good drinking water has some qualities.

Some qualities of good drinking water are:

1. It has no taste. It is tasteless.
2. It has no particles in it.
3. It has no germs in it.
4. It does not smell. It is odourless.
5. It has no colour. It is colourless.



We face certain dangers when we use unsafe water.

Some dangers of using unsafe water are:

1. We may suffer from diseases like cholera, dysentery and typhoid.
2. We may also get certain skin diseases.

Think-pair-share

Brainstorm and identify human activities that make water unsuitable for use.

Human activities that make water unsuitable for use

Our water bodies become unsafe for use when people engage in certain activities that pollute them. Some of these activities are:

1. Toxic waste disposal
2. Sewage disposal
3. Deforestation
4. Mining
5. Littering and fertilizer application
6. Application of pesticides
7. Herbicides
8. Industrial and agricultural practices

1. Toxic waste and sewage disposal

Sewage is a waste water from our homes and some industries.

When people dispose of these toxic waste and sewage into water bodies they become dirty and unsafe for use.



Sewage disposal

2. Deforestation

Deforestation is the cutting down of trees without replanting new ones to replace them.

When trees close to a river body are cut and are not replanted, the land becomes bare. When it rains, the rain water washes most of the soil and other waste materials on the land into the water body.

These materials pollute the water body thereby making it unsafe for use.



Deforestation around a water body

3. Mining

Mining is a process by which natural minerals like gold and diamond are dug from the ground. Mining is one of the major activities that destroy our water bodies. This is because there are people who use machines and other tools to mine minerals without using proper means. This is known as illegal mining. In Ghana, illegal mining is referred to as "galamsey".



Mining activity

4. Littering

We pollute the land and water bodies when we litter. Dropping rubbers, pure water sachets and plastic bottles on the ground are bad practices that pollute our land. When it rains, the rain water washes these rubbish into our water bodies making them dirty. When water bodies become dirty, they are unsafe for use.



Land pollution

Class discussion

Brainstorm and discuss ways we can prevent, minimize and control water pollution.

PROJECT WORK

1. Work in groups. Create concept maps on the causes, control and prevention of water pollution.
2. Draw and use a Future's Wheel to trace the effects of water pollution on the environment.

TEST YOUR UNDERSTANDING

A. In your community, there is only one source of water which is a river. Everybody in the community depends on this river mainly for cooking and drinking. Despite the chief's frequent warnings, there are people in the village who still engage in certain activities that pollute the river. The children in your community often fall sick any time they drink or eat food prepared with this water.

1. List and explain some of the human activities the people in your community engage in that pollute the river.
2. Mention some of the diseases the people in your community suffer from when they drink or cook with this water.

3. Assuming you are the chief of this community, what are some of the measures you will put in place to stop people from polluting the river?

B. The men in this community are mainly fishermen. What can the people in this community do to keep this water body clean always?



Fishing community

2.1.5.2 HOW TO MAKE AND KEEP AIR CLEAN IN OUR ENVIRONMENT

Keywords

Clean air Unclean air Air pollutants Air pollution
Sources Contaminated Harmful Afforestation Policies

Introduction

We breathe in air to stay alive. Air is very important to us and this is why we must keep it clean always. However, certain human activities make the air we breathe unclean. Breathing unclean air is very harmful to our health.

Brainstorm

What do you understand by clean and unclean air?

What is unclean air or air pollution?

Unclean air is also known as polluted air.

Unclean air is air that is contaminated or dirty. There are certain substances that make the air unclean when they are released into the atmosphere. These substances are called **air pollutants**. Some examples of air pollutants are **smoke** and **dust**.

Air pollution occurs when air pollutants get into the atmosphere and make the air unsafe for breathing.

Air pollutants and their sources

Sources of air pollutants refer to the various activities that release dirt into the atmosphere. Some of these activities include smoke released from factories and industries, smoke released from burning of waste materials and bush burning, dust from construction sites and many more.

Some sources of air pollutants are shown in the pictures below.



1. Smoke from factories



2. Smoke from car exhausts



3. Bush burning



4. Charcoal production



5. Dust from construction site



6. Untarred roads

Ways to keep air clean in our homes and environment

1. Afforestation (planting trees and grasses)

In order to keep the air clean we must avoid cutting down trees. Trees help to absorb excess carbon dioxide (smoke) released into the atmosphere. Planting of trees and grasses in the environment also prevent dust from getting into the atmosphere. This will make the air clean and also provide human beings and animals with oxygen to breathe.



2. Avoiding frequent and uncontrolled burning

In order to keep the air clean we must avoid setting bushes and forests on fire. Uncontrolled bush fires release large amounts of smoke into the atmosphere. This makes the air very unclean for us. Charcoal producers who cut down and burn trees anyhow also pollute the air.



3. Regular maintenance of cars and machines

Old cars are also called over-aged cars.

Over-aged cars as well as faulty cars often release a lot of smoke into the atmosphere. It is always important that car owners maintain their cars regularly. Machines used in factories that emit a lot of smoke must also be regularly maintained. This will keep the cars and machines in good shape and will prevent them from releasing large amount of smoke to pollute the air.

The government can also help to prevent air pollution by placing a ban on the importation of over-aged cars and machines into the country.



4. Public education

We can educate our friends and people in our communities about air pollution and its causes and effects.

The government can also introduce policies that will educate people and make them aware of the causes and effects of air pollution.



ASSIGNMENT

1. Design a concept map on the causes, prevention and control of air pollution.
2. Draw and use a Future's Wheel to trace the effects of air pollution on the environment.

TEST YOUR UNDERSTANDING

APPLY YOUR KNOWLEDGE

A. At school today you learnt about pollution and how it affects our health and the climate. Based on what you have learnt, you now understand why the people in your community are always suffering from certain diseases.

1. List some of the things the people in your community engage in that pollute the air.
2. In a short essay, educate the people in your community on what to do in order to keep the air clean always.
3. Briefly explain how air pollution affects our climate.

B. Musa leaves with his parents in the Eastern region. During vacation, Musa traveled to Salaga in the Savannah region to visit his grandmother.

There is a factory in Salaga that produces charcoal. The people in Salaga and its neighbouring towns use the charcoal to cook and do many other things. For this reason, a lot of trees are cut down from the Salaga forest to produce large quantity of charcoal.

A few days after Musa's stay in Salaga, he fell seriously ill. He started coughing and he later developed asthma.



Salaga charcoal producing factory

1. What could be the cause of Musa's ailment?
2. How does felling of trees increase the amount of carbon dioxide in the atmosphere?
3. What is the effect of carbon dioxide on human beings?
4. What advice will you give to the charcoal producing factory in Salaga in order to keep the air clean?



Key points to remember

1. The rotation of the earth is what causes **day and night**.
2. Sunlight provides the energy needed by plants to make their own food through a process called **photosynthesis**.
3. The cycle water goes through before it falls on the surface of the earth as rain is called the **Hydrological (Water) Cycle**.
4. Too much of carbon dioxide gas released into the atmosphere can have negative effect on our health, on the environment and the climate.
5. Mining of minerals without proper means and license from the government is known as **illegal mining** which is popularly known in Ghana as **'galamsey'**.
6. In order to keep the air clean, we must avoid cutting down trees and engaging in uncontrolled burning.

Trees help to absorb carbon dioxide that is released into the atmosphere through the burning of fossil fuels, waste materials and bushes or forests.

SUB-STRAND 2: LIFE CYCLES OF ORGANISMS

By the end of this sub-strand, the learner will:

CONTENT	STANDARD	INDICATORS
B5.2.2.1 Demonstrate understanding of life cycle of a plant.		B5.2.2.1.1 Relate structure of the parts of a plant (leaves, stem, root, flower) to the functions they perform. B5.2. 2.1.2 Compare the differences in germination of bean and maize seeds.

SUB-STRAND

2

LIFE CYCLES OF ORGANISMS

2.2.1.1 STRUCTURE OF THE PARTS OF A PLANT

Keywords

Flowering plant

Non-flowering plant

Anchor

Trunk

Fibrous roots

Tap roots

Photosynthesis

Chlorophyll

Introduction

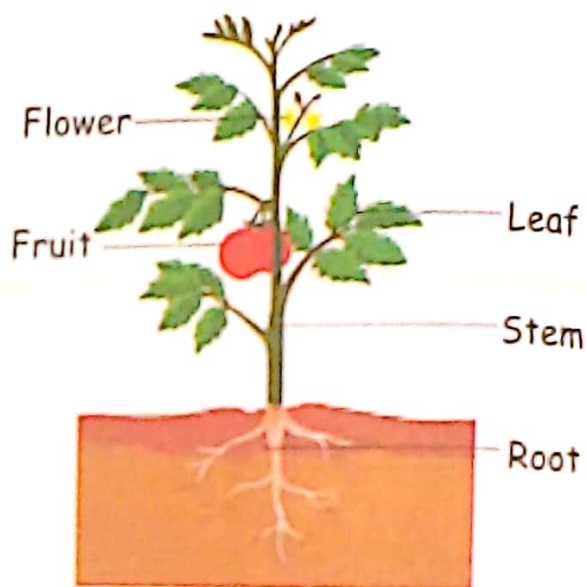
Plants are living things that grow from the soil.

The structure of a plant is made up of two parts. These are the root and the shoot.

The root is the part of the plant that is found in the soil. The shoot is the part of the plant found above the ground. The shoot is made up of the stem, the leaves and the flowers.

Some plants grow flowers, seeds and fruits but other plants do not. Plants that grow flowers are called **flowering plants**. Plants that do not grow flowers are called **non-flowering plants**.

Some examples of plants are mango tree, neem tree, cocoyam plant, tomato plant and plantain plant.



Parts of a plant



Some examples of plants

Activity 2.1**To show the parts of plants**

Things needed: A young plant with flowers.

Caution: The activity should be done under the supervision of your facilitator.

What to do:

Work in groups

1. Go on a nature walk with your facilitator. Uproot young plants from your school surroundings and bring them to class.
2. Look at the plant carefully and show the various parts. That is the root, the stem, the leaves and the flowers.
3. Show the part of the plant that was in the soil.
4. Show the parts of the plant that you saw above the soil.
5. Draw, colour and label the parts of the plant in your exercise book.

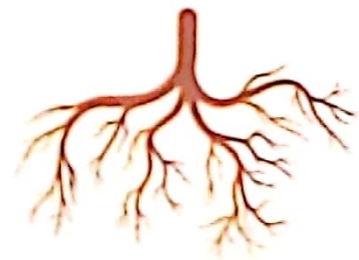
Functions of the parts of a plant

All the different parts of a plant perform various functions.

Let us look at the functions of each part of a plant.

The roots

The root is found in the soil. The root anchors the plant firmly in the soil. It also absorbs water and nutrients from the soil and sends them to other parts of the plant. There are two types of roots. These are tap root and fibrous root.



Root of plant

The stem

The stem is the middle part of a plant. It supports the upper part of the plant including the branches and the leaves. The stem takes water and nutrients from the roots to the leaves. It also carries food from the leaves to other parts of the plant. The stem of a big tree is called a **trunk**. For example, a mango tree is a big tree which has a trunk.



Stem of plant

The leaves

Leaves are the most important part of a plant.

Leaves form the part of a plant that make food for the plant through a process called **photosynthesis**. The leaves of plants contain a green colouring liquid known as **chlorophyll**. Leaves absorb light from the sun.

Green plants use sunlight, chlorophyll, water and carbon dioxide to make their own food. Some examples of plant leaves are cabbage, lettuce, cocoyam leaves (kontomire), banana leaves, basil leaves, bay leaves, mango leaves and neem leaves.



Cocoyam leaves
(Kontomire)



Cabbage



Lettuce



Mango leaves

The flower

The flower is the most beautiful and colourful part of a plant.

It is the part of a plant that makes seeds and fruits.

Some examples of flowers are sunflower, rose flower, strawberry flower, tomato flower and okro flower.



Sunflower



Rose flower



Strawberry plant
with flowers



Tomato plant
with flowers

POEM

The roots of a plant grow underground,
roots are part of a plant.
The stem on a plant supports the leaves and branches
stems are part of a plant.
The leaves on a plant make food,
leaves are part of a plant.
The flowers on a plant grow into seeds and fruits,
flowers are part of a plant.

TEST YOUR UNDERSTANDING

DRAWING TEST

The drawings below represent the various parts of a plant.
Identify each part and explain their functions to the plant.



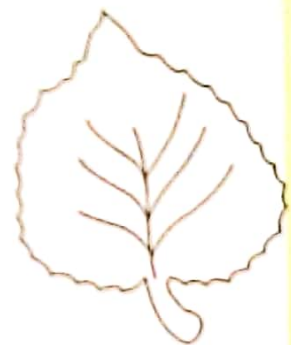
A



B



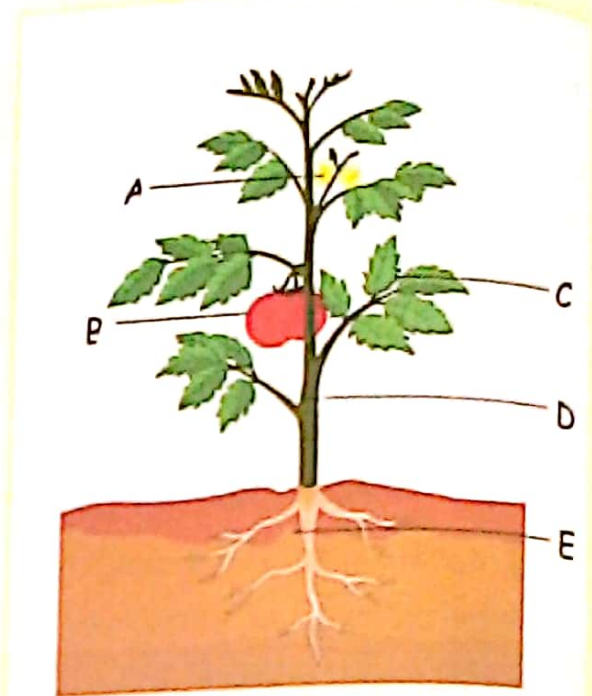
C



D

TEST YOUR THINKING SKILL

1. Label the parts of the plant on your right.
2. Which part of the plant will help the plant to prepare its own food? Explain how.
3. Which part of the plant sends water to the other parts of the plant?
4. Which part of the plant can be planted to continue the life cycle of the plant?
5. How does the life cycle of the plant show a cyclical movement?

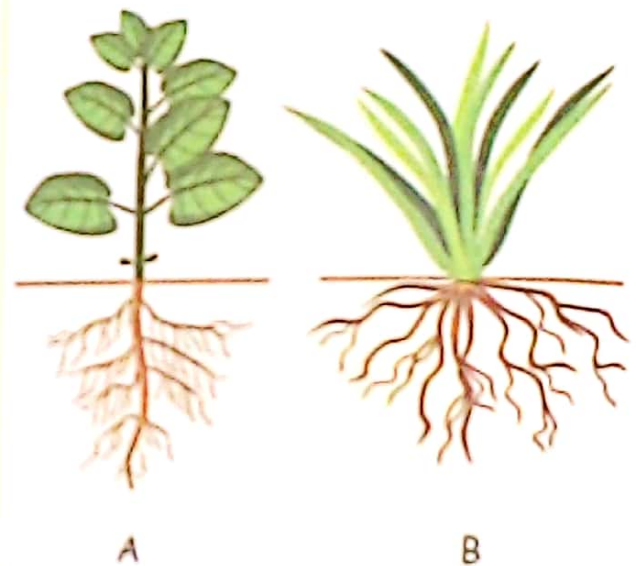


RESEARCH AND ANSWER

Visit **GOOGLE** website and do further research on parts of a plant. Based on the outcome of your research, answer the following questions.

Picture A and Picture B represent two types of roots.

1. Name the type of roots in both pictures.
2. What is the difference between root A and root B?
3. Give two examples each of plants with these types of roots.



2.2.1.2 COMPARE THE DIFFERENCES IN GERMINATION OF BEAN AND MAIZE SEEDS

Keywords		
Germination	Seedlings	Embryo
Cotyledon	Monocotyledon	Dicotyledon

Introduction

What do you remember about seeds?

In our previous classes, we learnt that plants come from seeds.

When we sow seeds, they grow to become big plants. The process by which seeds grow into seedlings or new plants is known as **germination**.

In this lesson we shall learn more about bean and maize seeds and the stages they go through to germinate into new plants.

All seeds have three main parts. These are: 1. The seed coat 2. The embryo and 3. The seed leaf (cotyledon).

Below are the three main parts of a bean and maize seed and their functions.

Functions of the three main parts of a seed

1. The seed coat

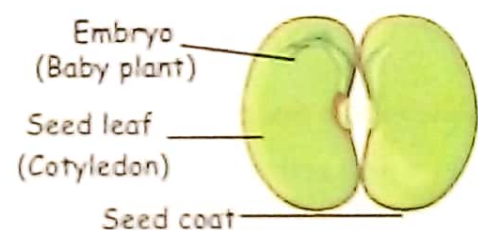
The seed coat is what covers the seed. Its function is to protect what is inside the seed from any harm.

2. The embryo

The embryo is a very important part of every seed. The embryo which is also known as the baby plant is found inside the seed. When conditions are right for a seed to grow, it is the embryo that germinates into a seedling.

3. The seed leaf (cotyledon)

The seed leaf forms part of the seed that stores and supplies food to the embryo.



Bean seed

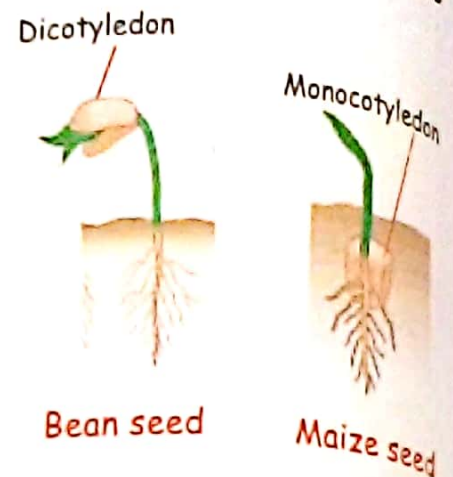


Maize seed

The seed leaf also provides nutrients that the embryo needs to grow into a plant. Always remember that, some seeds germinate with only one seed leaf and others germinate with two seed leaves. Seeds that germinate with one seed leaf are called **monocotyledon** or **monocots**. And those that germinate with two seed leaves are called **dicotyledon** or **dicots**.

Bean seeds germinate with two seed leaves and are hence called **dicotyledon**. The two leaves provide food to the seedling. During germination, the cotyledon moves above the soil.

Maize seeds germinate with only one seed leaf and hence they are called **monocotyledon**. During germination the cotyledon remains in the soil.



Let us perform an activity to know the differences between the germination of a bean seed and a maize seed. Observe how the two seeds germinate and discuss the differences in their germination.

NOTE: Seeds will only grow well when they have the right conditions. These conditions include temperature, water, oxygen (air) and sunlight.

Activity 2.2 To compare the differences in the germination of bean and maize seed

Materials needed: Dry beans and maize seeds, water, transparent containers and soil.

This activity will take some days so be patient and observe the growth process.

Note: The activity should be done **under the supervision of your facilitator**.

What to do: Work in groups

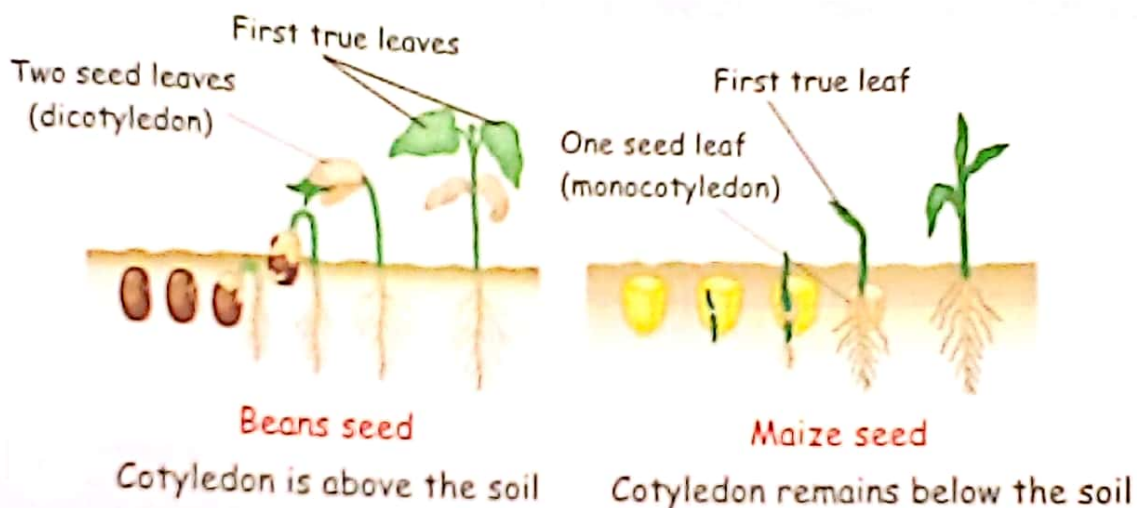
1. **Group A** should plant bean seeds and **Group B** should plant maize seeds.
2. Each group should fill their containers with soil.
3. Both groups must first observe the various seeds and make sure they are good and can be planted (viable seed).
 - Observe the growing stages of both seeds and write reports on them.
 - Your reports should include diagrams of each stage of germination.

Stages to observe

1. Observe the dry seed coat.
2. Observe how the seed coat absorbs water, swells up and ruptures or peels off.
3. Observe the sprouting of the root.
4. Observe the sprouting of the stem and the seed leaves.
5. Observe the elongation of the root and stem.
6. Observe whether the seed leaves remain in the soil or above the soil.

Note: Under a good condition, a bean seed may take 7 to 10 days to germinate while a maize seed may take 3 to 10 days to germinate. Maize seeds germinate with only one seed leaf with the cotyledon remaining in the soil while beans seeds germinate with two seed leaves with the cotyledon above soil.

Observe the following growth processes of your beans and maize seeds as shown in the diagram below.



TEST YOUR UNDERSTANDING

REPORT WRITING

From the activity performed, write a report by:

1. drawing a table and list the differences in the germination of maize and beans seeds.

Present your report for discussion.



Key points to remember

1. The basic structure of a plant is made up of the root, the stem, the leaves and the flowers.
2. Leaves form part of a plant that make food for the plant through a process called **photosynthesis**.
3. Seeds have three main parts. These are:
 1. The **seed coat**
 2. The **embryo** and
 3. The **seed leaf (cotyledon)**.
4. Seeds that germinate with one seed leaf are called **monocotyledon** or **monocots**.
5. Seeds that germinate with two seed leaves are called **dicotyledon** or **dicots**.

STRAND 3

SYSTEMS

SUB-STRAND 1: THE HUMAN BODY SYSTEMS

SUB-STRAND 2: SOLAR SYSTEM

SUB-STRAND 3: ECOSYSTEM

SUB-STRAND 1: THE HUMAN BODY SYSTEMS

By the end of this sub-strand, the learner will:

CONTENT	STANDARD	INDICATOR
B5.3.1.1	Recognise that different parts of the human body work interdependently to perform a specific function.	B5.3.1.1.1 Know the parts of the respiratory system in humans.

SUB-STRAND
1

THE HUMAN BODY SYSTEMS

3.1.1.1 PARTS OF THE RESPIRATORY SYSTEM IN HUMANS

Keywords

Respiratory system Carbon dioxide Oxygen Inspiration expiration

Introduction

The human body system is made up of both external and internal organs.

The external organs of the body include the nose, the mouth, the ears and the hands.

Some of the internal organs are the heart, the brain, the kidney, the liver, the intestines and the lungs.

The external and the internal organs of the body work together for the proper functioning of the body.

The internal organs of the body come together to form organ systems. Some examples of these organ systems are the digestive system, the nervous system and the respiratory system.

In this sub-strand, we shall look at one of the organ systems in the human body that is responsible for breathing. This organ system is called the **respiratory system**.

POEM

During inspiration, air passes through the mouth and the nose, down the throat, and through the trachea and bronchi to the lungs.

In the lungs, air travels through branching bronchioles which end in small clusters of microscopic sacs called alveoli.

Oxygen molecules are transferred from the alveoli into the bloodstream, and carbon dioxide moves out of the bloodstream and back into the respiratory track where it is released through the mouth and nose during expiration.

Perform these exercises

1. First breathe in and out for sometime. How do you feel? When you breathe in, you allow air (oxygen) to enter your body and when you breathe out, you bring air (carbon dioxide) out of your body.
2. Try laughing while holding your breath. Are you able to laugh? You cannot laugh while holding your breath. In order to laugh, you need to breathe.



Breathe in and breathe out



Breathing is when you pull air into your body and then you let it out. The part of your body system that is responsible for breathing is called **the respiratory system**.

Our respiratory system helps us to breathe. Without breathing, living things cannot stay alive. Breathing also makes it possible for us to laugh, talk, sing and whistle.

The respiratory system is responsible for taking oxygen into our body and bringing out carbon dioxide from our body.

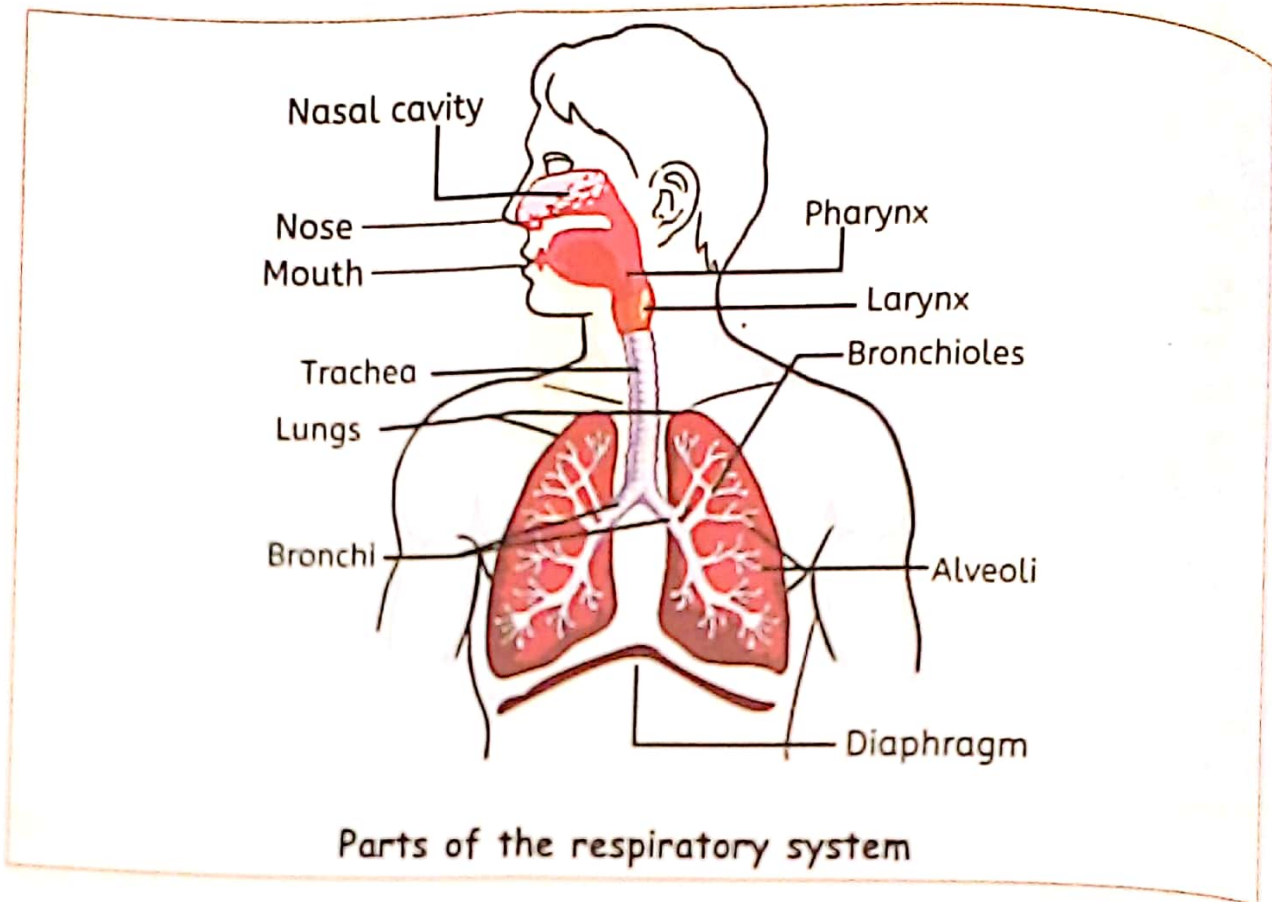
Oxygen is important for keeping us alive because it gives our body the energy to function well. Carbon dioxide on the other hand is harmful to our body and must be removed from the body.

Group discussion

In groups, discuss some activities you cannot do without breathing. Share your findings with the class.

Parts of the respiratory system

The diagram below represents the human respiratory system. Carefully study the various parts of the respiratory system.



The respiratory system is made up of different parts. The parts of the respiratory system include the nose, mouth, nasal cavity, pharynx, larynx, trachea, the lungs, bronchi and bronchioles, the alveoli and the diaphragm.

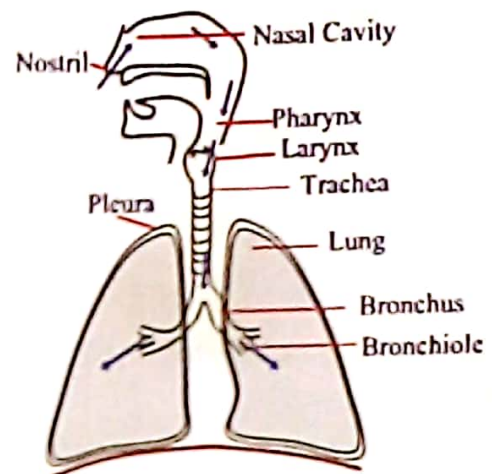
- 1. The nose:** The nose has two holes called nostrils. Air enters into our respiratory system through our nostrils.
- 2. The mouth:** Apart from the nose, we also breathe through our mouth.
- 3. The nasal cavity:** Behind our nose is a space called the nasal cavity. There are little hairs in the nose through to the nasal cavity. These hairs prevent dirt in the air from going into our lungs.

4. **Pharynx:** The pharynx is also referred to as the throat. It is a passage right behind the mouth. Air that is taken in through the nose and the mouth passes through the pharynx. Air that passes through the pharynx goes straight into the larynx.
5. **Larynx:** The larynx is also known as the voice box. The larynx helps people to talk and sing. The 'Adams apple' lies in the larynx.
6. **Trachea:** The air from the larynx passes through a pipe called trachea before getting into the lungs. The air (carbon dioxide) we breathe out also passes through the trachea through to the nostrils before getting into the atmosphere.

7. **Lungs:** The lungs are the main organs that allow the air we breathe in to get into our body. The lungs also help to bring out carbon dioxide from our body. The exchange of air (oxygen and carbon dioxide) takes place in the lungs.

Do you know how air gets into our lungs?

Look at the diagram. Study the direction of the arrows to help you know how the air we breathe in gets into our lungs.



How air gets into our lungs

8. **Bronchus and Bronchioles:** The bronchus splits into smaller branches called the bronchioles. Bronchioles carry oxygen(air) into the alveoli.
9. **Alveoli:** The alveoli is also known as the air sacs. The alveoli allows oxygen from the lungs to enter into the bloodstream. The alveoli also helps to move carbon dioxide from the blood into the lungs to be breathed out. Respiration ends in the alveoli.
10. **The diaphragm:** The diaphragm can be found below the lungs. The diaphragm contracts and becomes flat when we breathe in. When we breathe out, the diaphragm relaxes and pushes carbon dioxide from the lungs.

ACTIVITY 1.1 Design a breathing model

The pictures below show various breathing models displayed for exhibition by Basic 5 learners from different schools.

Look at them carefully and design your own breathing models using the following materials:

Transparent plastic bottles, two balloons, a pair of scissors, a drinking straw, a play dough or clay.



Made by Abu



Made by Ekuu



Made by Kpakpo

ACTIVITY 1.2 Design a respiratory system model

The pictures below show various respiratory system models displayed for exhibition by learners from different schools.

Look at them carefully and design your own respiratory system model using materials of your choice.



Made by Dela



Made by Serwaa



Made by Nii

Diseases and lifestyles that affect the respiratory system

The respiratory system can be affected by various diseases. Some of these diseases are cough, asthma and lung cancer. Human beings are likely to suffer from these diseases if they engage in certain activities and lifestyles. Some lifestyles and common human activities that affect our respiratory system are:

1. Smoke released from car exhaust.



2. Burning bushes and rubbish to release smoke.



3. Smoking cigarette.



4. Playing in dusty environment.



5. Failure to exercise regularly.



6. Eating fatty foods.



Diseases of the respiratory system

Some examples of diseases that can affect our respiratory system are;

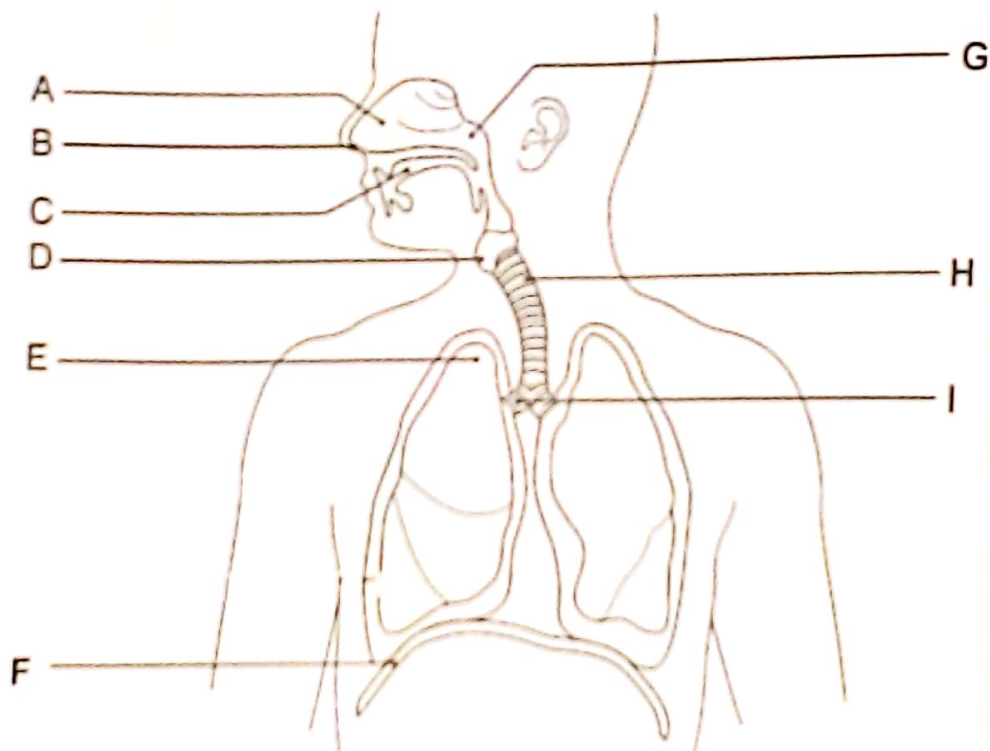
1. Whooping cough
2. Lung cancer
3. Throat cancer
4. Pneumonia

TEST YOUR UNDERSTANDING

PRACTICAL KNOWLEDGE

A. Look at the diagram below carefully and answer the questions that follow.

1. What does the diagram below represent?
2. Name the parts labeled A-I.
3. Observe the part labeled E and draw three things that can be found there.
4. Discuss some lifestyles and human activities that can negatively affect part E.



B. Study the diagram below carefully.

Label the following parts of the respiratory system.

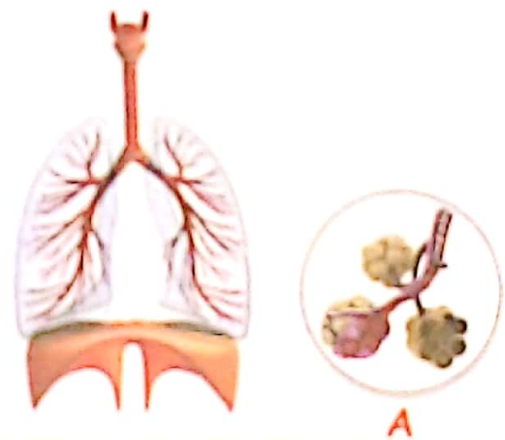
1. Bronchi 2. Bronchioles 3. Alveoli 4. Lung 5. Diaphragm 6. Trachea



How smart are you?

Look at the diagram on your right.

1. What is the name of the part labeled A?
2. Which part of the respiratory system can this part be found?
3. Describe its function.





Key points to remember

1. Breathing is when you pull air into your body and then you let it out.
2. The parts of our body responsible for breathing is called **the respiratory system**.
3. Oxygen is important for keeping us alive because it gives the body the energy to function well.
4. The parts of the respiratory system include the nose, mouth the nasal cavity, pharynx, larynx, trachea, the lungs, bronchi and bronchioles, the alveoli and the diaphragm.

SUB-STRAND 2: SOLAR SYSTEM

By the end of this sub-strand, the learner will:

CONTENT	STANDARD	INDICATORS
B5.3.2.1	Show understanding of the orderliness of the sun, planets and satellites in the solar system, as well as the important role of the sun in the existence of the solar system.	B5.3.2.1.1 Identify the components of the solar system (sun, earth, moon, other planets, satellite).

SUB-STRAND
2

THE SOLAR SYSTEM

3.2.1.1 THE COMPONENTS OF THE SOLAR SYSTEM

Keywords

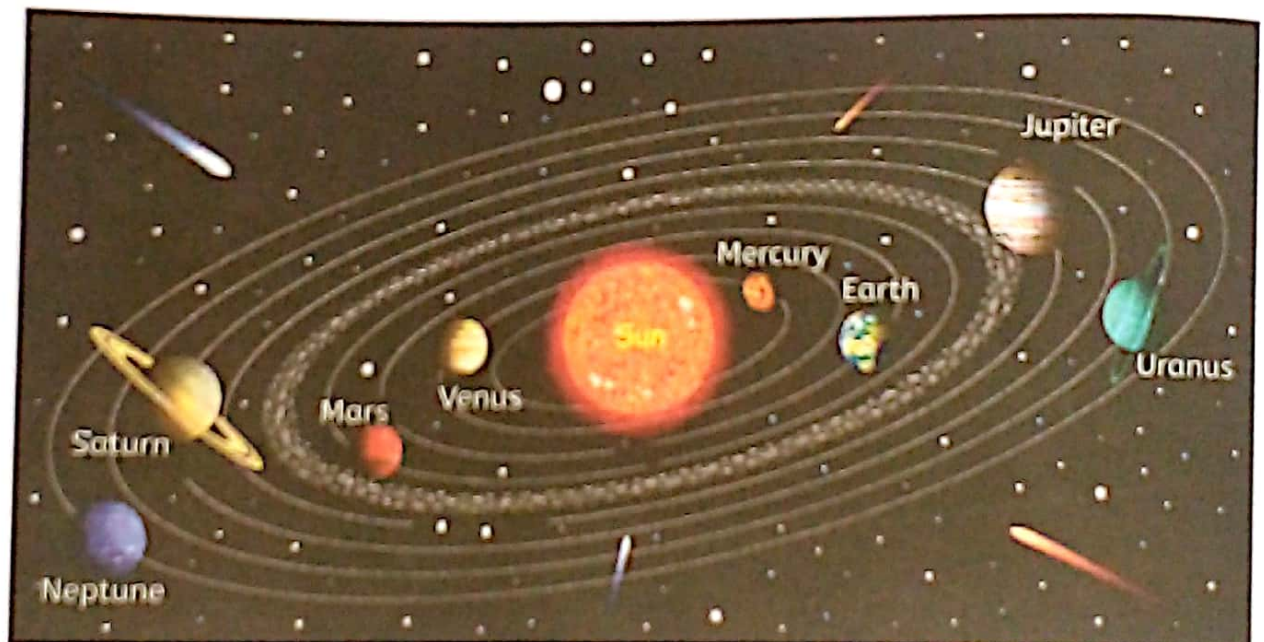
Solar system Components Planet Orbit Galaxy
 Photosynthesis Revolve Rotation Axis Revolution Satellite

Introduction

Have you ever looked into the sky and imagined what could be beyond it? When we look at the sky during the day we see the sun. During the night we see the moon and thousands of stars in the sky. Beyond the sky is a whole big space called **the solar system**.

The solar system is made up of the sun, the earth, the moon, the stars, the seven other planets and satellites.



The sun, the moon, the stars, the planets and the satellites form the components of the solar system.





The solar system


POEM

The sun, a star at center point. It shines its golden rays beyond
A place in space so far away, eight planets receiving dusk till dawn





Mercury is first in line, Venus known for its bright shine 
Earth, a world that is yours and mine 

That will bring us right to Mars, Mars, Mars, Mars 

Jupiter so big indeed, Saturn with its many coloured rings 

Uranus is greenish blue, Neptune is the same size, this is true 

Pluto is the farthest one by far and it is a dwarf planet.

Now you know where planets are, and that will bring us back to
Sun, Sun, Sun, Sun    



THE SUN

The sun is a huge ball of fire made up of burning gases such as hydrogen and helium. The sun is found at the centre of the solar system. All the eight planets including the earth orbit (travel) round the sun. The sun is also described as a star. Stars burn to produce heat and light. Do you know that stars are bigger than they appear in the sky? The stars are bigger than most objects we see around us in our environment but they look smaller in the sky because they are very far from us.



The sun

Take a quick look at the picture of the solar system.

Do you see how far our planet earth is from the sun?

Do you also see how much bigger the sun is than the planet earth?

The sun is 109 times bigger than the earth.

A group of stars are known as a **Galaxy**. The sun together with the group of stars is known as **Milky Way Galaxy**.

Importance of the sun to life on earth

Have you ever imagined how life without the sun will be?

The sun is the source of life to all living things on earth. Without the sun, there would be no life on Earth. Some importance of the sun to the earth include the following.









1. The sun provides the earth with the right amount of heat which keeps our body warm. Without the sun, the surface of the earth will be so cold that no living thing will survive.
2. The sun is the main source of light to the earth. Light from the sun is called **sunlight**. The sun shines in the day to give us light. Without light from the sun, the surface of the earth will be totally dark.
3. We get Vitamin D from the sun. Vitamin D is needed by our body for strong bones and teeth.
4. Without sunlight, plants cannot grow well. Plants make their own food using carbon dioxide and energy from the sunlight through a process called **photosynthesis**.
5. Energy that comes from the sun can be used to generate electricity. Energy from the sun is called **solar energy**. This form of energy is used to generate electricity using solar panels.
6. Farmers use heat from the sun to dry their farm crops such as maize, millet, wheat and beans.

What other important uses of the sun to the earth do you know?

The planets of the solar system

What are planets?

Planets are heavenly bodies that move/orbit/revolve round the sun. An orbit is the path that an object takes round another object. There are eight planets in the solar system that orbit round the sun. The 8 planets in the solar system have been listed on your right with a simple song to help you remember them easily.

PLANETS	RUBEN'S SERIES CHORUS	
	1. Mercury	Mrs
	2. Venus	Vannesa
	3. Earth	Eats
	4. Mars	Mama's
	5. Jupiter	Jumbo
	6. Saturn	Stew
	7. Uranus	Under
	8. Neptune	Neptune

Description of the planets

1. Mercury

It is the first planet in the solar system. It is the smallest and closest planet to the sun. Though Mercury is the closest planet to the sun, it is not the hottest planet. It is not the hottest planet because it has a thin atmosphere that does not absorb heat from the sun. Mercury is described as a rough and rocky planet which has no water and air and hence does not support plant and animal life.



The planet Mercury

2. Venus

It is the second planet after Mercury. Venus is described as the hottest and brightest planet in the solar system. This is because Venus has a thick atmosphere that absorbs and retains heat and light from the sun.



The planet Venus

This makes Venus the hottest and brightest planet. Since the earth is the closest planet to Venus, we see its brightness on earth within a few hours after the sun sets or several hours before the sun rises. This is why Venus is referred to as the **morning star**.

3. The earth

The **earth** is the planet on which we live. It is the third planet from the sun. The earth is the only planet on which human beings, animals and plants can live. This is because of the presence of good temperature, water and air on planet earth.

It takes the earth $365\frac{1}{4}$ days to revolve round the sun to make one revolution. The earth has one moon which revolves round it.



Morning star



The planet Earth with one moon

4. Mars

It is the fourth planet from the sun. It is referred to as the **red planet** because it has half of its surface appearing red. Mars is dusty and rocky and it is always cold. Living things cannot survive on planet Mars.

It takes Mars 687 days to revolve round the sun to make one revolution.



The planet Mars

RESEARCH

Do you sometimes wonder why planet mercury is the first and closest planet to the sun yet it is not the hottest planet?

Visit [google.com](https://www.google.com) and do further research to find out why Mercury is not the hottest planet.

5. Jupiter

It is the biggest planet in the solar system. Its surface is made up of poisonous gases. Jupiter is very cold because it is far from the sun. As a result of this, Jupiter does not support plant and animal life. Jupiter takes 12 years to complete one revolution.



The planet Jupiter

6. Saturn

It is the second biggest planet in the solar system after Jupiter. It has a series of colourful rings and nine moons. It is very windy on planet Saturn so the temperature there is always cold. Saturn does not support plant and animal life. It takes Saturn $29\frac{1}{2}$ years to complete one revolution.



The planet Saturn

7. Uranus

It is the seventh planet from the sun. It has five satellites or moons. It has very cold temperature which does not support plant and animal life.



The planet Uranus

8. Neptune

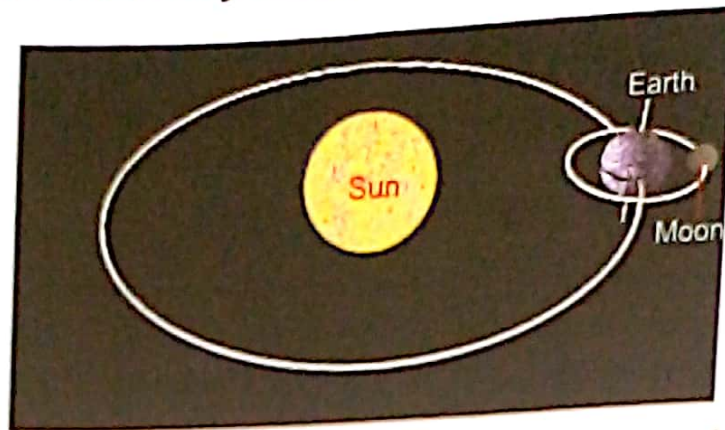
It is the eighth planet from the sun. It has two satellites or moons. It also has a very low temperature because it is the farthest from the sun. Neptune cannot support plant and animal life. It takes Neptune 165 years to complete one revolution.



The planet Neptune

Position of the sun, the moon and the earth in the solar system

The sun is at the center of the solar system. All the planets including the planet earth move round the sun. The sun does not move. It is the moon that moves round the earth every 28 days.



Position of the sun, the moon and the earth in the solar system

Movement of the earth

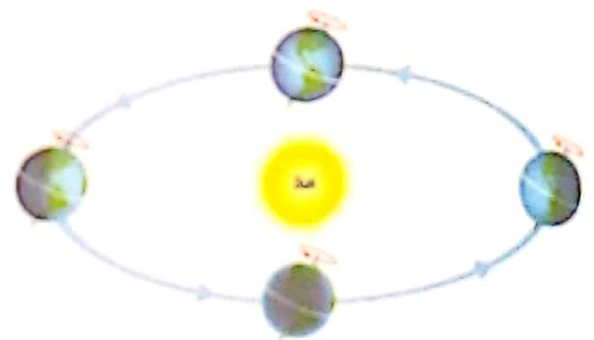
The earth rotates or spins on its axis through an angle of 360° . The earth has its axis and it turns round it. An axis is an imaginary line that objects turn round. The spinning of the earth on its axis is called **rotation**.

The earth spins 360° to make one complete rotation which is 24 hours. The rotation of the earth on its axis is what causes day and night on the surface of the earth.



Rotation of the earth on its axis

The movement of the earth round the sun is called **revolution**. The earth and the other planets revolve round the sun. It takes the earth $365 \frac{1}{4}$ days which is equal to 1 year to make one complete **revolution**. It takes other planets either more or less days to make a complete revolution round the sun.

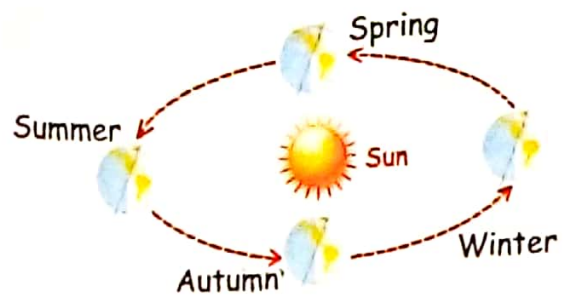


Revolution of the earth

The rotation of the earth on its axis and the revolution of the earth round the sun also causes the four seasons.

That is summer, winter, autumn and spring.

The solar system



Satellites

Satellites are objects that orbit (move round) the earth and some other planets. There are two types of satellites. These are natural satellites and artificial satellites.

1. Natural satellites

Natural satellites are satellites that are already in existence. This means that they are made by God. An example of a natural satellite is the moon.



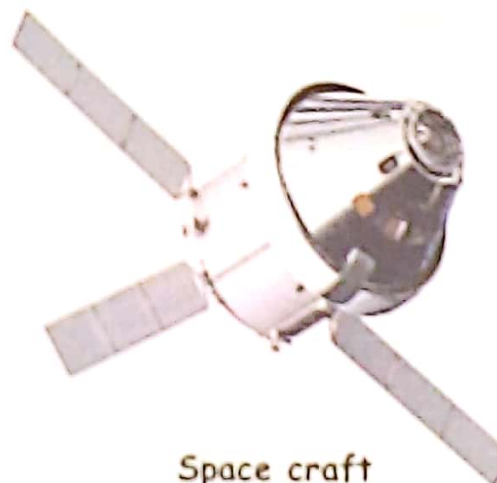
Moon

2. Artificial satellites

They are man-made objects (machines) that are sent into space to orbit (go round) the earth. Some examples of satellites made by man to travel into space are the space rocket and the space craft.



Space rocket



Space craft

CLASS DRAMA AND STORYTELLING

1. Role play the sun and the planets in the solar system.
2. Share folktales/stories about the moon.

ASSIGNMENT

Observe the planet Venus, the brightest object in the sky before sunset or several hours after sunrise and discuss your findings.

Project: Plan, design and make a model of the solar system.

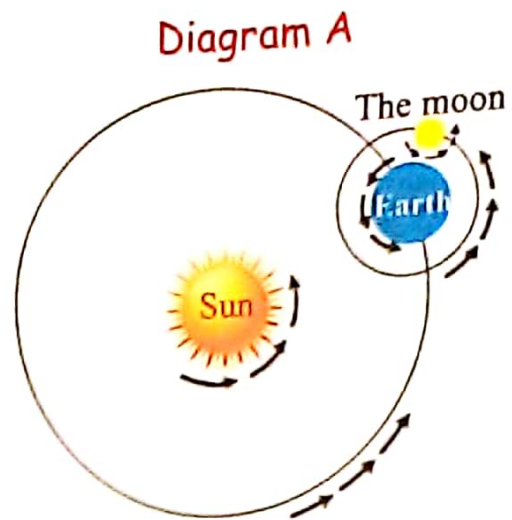
Build a model of the solar system using suitable materials such as blu tack, clay, cardboard and wood.

TEST YOUR UNDERSTANDING

- A. Look at the diagram below.
1. Numbers 1-8 represent different objects in the solar system. Identify and name each object.
 2. What is the benefit of the sun to object 3?



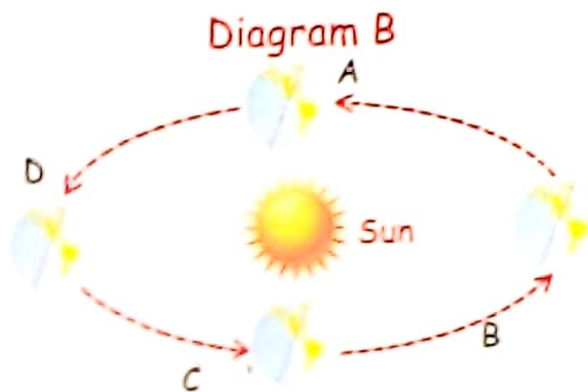
B. The diagram A on your right represents a simple solar system showing the position of the sun, the moon and the earth. Look at it carefully and answer the questions that follow.



1. How will you describe the position of the moon, the earth and the sun to your friend?
2. How does the sun benefit your grandfather who has a cocoa farm in the village?

C. Study diagram B carefully and answer the question that follows.

1. Describe the diagram and state what letter A, B, C and D represent.



HOW SMART ARE YOU? RIDDLE, RIDDLE!

1. I am the biggest among all the heavenly bodies and 109 times bigger than the third planet. **WHO AM I?**
2. I am a very huge body, within me you will find a lot of other heavenly bodies. Even the almighty big sun can also be found in me. The moon and the planets including the earth in which we live on, are all found in me. **WHO AM I?**

3. I form part of the solar system. I am sometimes referred to as the morning star. Although I am not the closest to the sun, I am described as the hottest and brightest planet. **WHO AM I?**
4. We are part of the heavenly bodies within the solar system. We burn to produce our own light, heat and energy. We do not receive light from any one. Because of our huge number, we have all come together to form one common group known as galaxy. **WHO ARE WE?**
5. I am a term used to describe the movement of the earth round the biggest object in the solar system. **WHO AM I?**
6. I am a term used to describe how I spin on my axis at an angle of 360° . **WHO AM I?**



Key points to remember

1. The sun, the earth, the moon and other planets form the components of the solar system.
2. The earth is the only planet that supports life.
3. There are eight planets in the solar system. These are: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune.
4. The rotation of the earth on its axis and the revolution of the earth round the sun causes the four seasons. These are summer, winter, autumn and spring.
5. Artificial satellites are man-made objects that are sent into space to orbit (go round) the earth. An example is the space rocket.
6. Natural satellites are satellites that are already in existence. An example of a natural satellite is the moon.

SUB-STRAND 3: ECOSYSTEM

By the end of this sub-strand, the learner will:

CONTENT STANDARD	LEARNING INDICATOR
B5.3.3.1 Show understanding of ecosystem, interdependency of organisms in an ecosystem and appreciate the interactions.	B5.3.3.1.1 Know how various organisms are adapted to survive in their habitat.

SUB-STRAND

3

ECOSYSTEM

3.3.1.1 HOW VARIOUS ORGANISMS ARE ADAPTED TO SURVIVE IN THEIR HABITAT

Keywords

Ecosystem Organism Adapt Habitat Adaptation

Introduction

In basic four, we learnt about the concept of the ecosystem.

Do you remember what an ecosystem is?

We learnt that ecosystem is the interaction between living things and non-living things in a given community.

What is a habitat?

A habitat can be found within an ecosystem.

A habitat is **a place where living organisms live.**



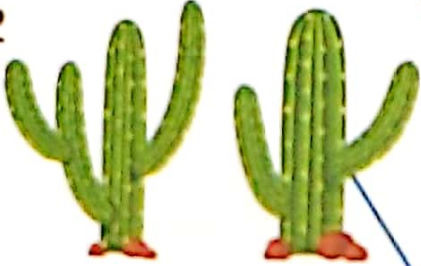





We can also define a habitat as a **natural home** for living organisms in an ecosystem.



Example of an ecosystem

In this lesson we shall learn how various organisms are adapted to survive in their habitat. Let us begin with a matching activity.

Matching activity:
Let us match the following living things to their habitats using the finger.

ANIMALS	HABITATS OF ANIMALS
1 	A 
2 	B 
3 	C 
4 	D 

In the activity, we were able to match the various animals and the plant to their habitats because that is where they live. Fishes live in water. Birds live on trees and deers live on the land. The various places where living organisms live are their habitats.

Basically, there are three types of habitats for all living organisms. These are **water habitat**, **land habitat** and **air habitat**.

1. Water habitat

Water habitat refers to the natural home of living organisms living in water. Some examples of water habitats are **sea, river, pond, stream, lake and lagoon**. Some examples of animals that live in water are fishes, crabs, turtles, octopus and whales. An example of a plant that grows in water is **waterlily**.



Water habitat

2. Land habitat

Land habitat is the natural home of organisms that live on land. Examples of some organisms that live on land include **human beings, elephants, goats and lions**. Majority of plants grow on the land. Only a few plants grow in water.



Land habitat

3. Air habitat

Air habitat is a natural home for living organisms that fly in the air and live on trees. Examples of such animals are **birds and insects such as parrot, eagle, butterfly and bees**. Though plants cannot grow in the air, there are few plants that grow on trees. Examples of such plants are climbing and creeping plants.



Air habitat

How various organisms are adapted to survive in their habitat

Group discussion

In groups, discuss the following questions and share your answers with the class.

1. Why do living organisms live in a particular habitat?
2. Why can't fishes live on land but in water?
3. Why can't a bird live in water?

Living organisms are able to live successfully in a particular habitat depending on their special body features. Fishes cannot live on land because they do not have special body features that will enable them to live successfully on land. Look at the pictures below.



Fish out of water



Fish dies when brought out of water to live on land

Can a bird live in water?

Some birds like ducks can swim on the surface of water but they cannot live in water. Birds cannot live in water because they do not have special body features that will help them to live in water. Birds have special body features that only help them to fly and live on trees.



Birds cannot live in water



Birds live on trees

The special body features of animals help them in various ways

Some of these ways are:

1. They help them to obtain their basic needs which include air, water and food.
2. They help them to deal with environmental conditions like the weather conditions.
3. They help them to defend themselves from other animals and be able to attack their enemies as well.
4. The special body features of animals also help them to respond to changes around them.

Think-Pair-Share

Mention some special body features of human beings.

Discuss with each other how the body features you have mentioned help human beings to survive in their habitat.

Adaptation

When a living thing is able to live successfully in a habitat, we say that the living thing has adapted to its environment. All organisms need to adapt to their habitat to be able to survive. The term that is used to describe how living things live successfully in a habitat is known as **adaptation**.

Let us look at how various organisms are able to adapt and survive in their habitat.

How birds are adapted to survive in their habitat (on trees and in air)

Some special features that enable birds to live in their natural habitat are:

1. Birds have wings that help them to fly.
2. They have hollow and light bones that reduce their weight and helps them to fly in the sky.
3. They have feathers on their skin that give them warmth and also protect them against heat loss.
4. They have sharp claws for landing and grasping.
5. They have pointed beak for picking and perking food.



Bird

How fishes are adapted to survive in their habitat (water)

Some special features that enable fishes to live in their natural habitat are:

1. Fishes have scales on their body for protection.
The scales also make the surface of their body smooth and slippery for easy movement in water.
2. Fishes have gills that help them to breathe in water.
3. Fishes have fins that help them to swim in water.
4. Fishes have special eyes that help them to see in water.
5. The colour of fishes blend with their environment.
This helps them to protect themselves from their enemies.



Fish

How frogs are adapted to their habitat (in water and on land)

Frogs are amphibians. Amphibians are animals that can live and survive on both land (moist environment) and in water. There are special body features that help frogs to live successfully in both water and on the land. These special body features are:

1. Frogs have very thin skin which they breathe through when they are in water.
2. They have flat ears which prevents water from getting into their ears when in water.
3. Frogs have strong back legs, a flat head and a smooth body that help them to swim in water.
4. Frogs have their eyes positioned on top of their head. This enables them to see when they are on land and in water.
5. Their strong back legs and feet allow them to jump long distances on land.
6. Frogs have a long sticky tongue which allows them to catch insects for food without having to move their body.



Frog

How cactus plants are adapted to survive in deserts

Cactus plants are plants that grow in dry areas such as the desert. They can survive without water for a long time. Cactus plants have many features that allow them to live in deserts. Some special features of cactus plants are:

1. Cactus plants have very long fibrous root. This helps them to collect water from the ground when it rains.
2. Cactus plants have thick and fleshy stems that allow them to store a lot of water for a long period of time.
3. Cactus plants have spines that protect them from animals and birds that may want to feed on them.



Project

Below are models of different habitats designed by learners from the science and technology club for exhibition.



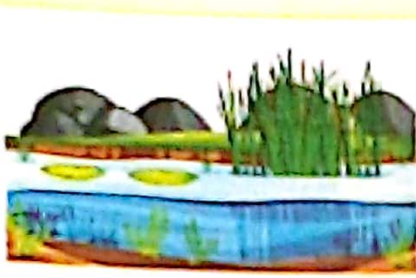
Plan, design and make your own model of a habitat using card board, paper, blu tack and clay to show the homes of some animals.

TEST YOUR UNDERSTANDING

PICTURE DESCRIPTION

Below are different types of habitats where organisms live.

1. Mention what type of habitat each picture represents.
2. Mention 5 animals you are likely to find in each habitat.



A



B



C

REASONING SKILL

Look at the two pictures below carefully.

1. Describe what has happened to the fish in picture B.



A



B

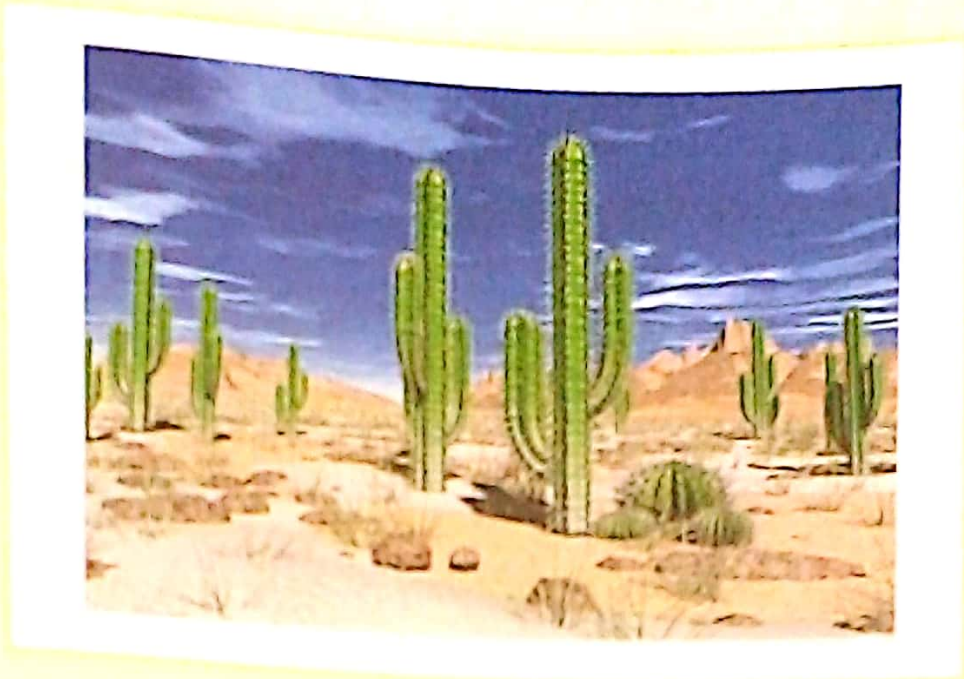
2. Look at the picture on your right.

In this picture, Miss Eagle has grabbed Mother Tiger's cub. Mother Tiger is unable to save its cub due to various reasons.

- a. Identify the reasons why the tiger is not able to save its cub.
- b. Mention two adaptation of eagles.



3. The plants below belong to the cactus plant family growing in a dry desert. Explain how these plants are able to survive in a desert where there is less or no rainfall.





Key points to remember

1. A habitat is a place where living organisms live .
2. There are three types of habitats. These are water habitat, land habitat and air habitat.
3. Living organisms live in a particular habitat depending on their special body features.
4. When a living thing is able to live successfully in a habitat, we say that the living thing has adapted to its environment.

STRAND 4

FORCES AND ENERGY

SUB-STRAND 1: SOURCES AND FORMS OF ENERGY

SUB-STRAND 2: ELECTRICITY AND ELECTRONICS

SUB-STRAND 3: FORCES AND ENERGY

SUB-STRAND 1: SOURCES AND FORMS OF ENERGY

By the end of this sub-strand, the learner will:

CONTENT	STANDARD S	INDICATORS
B5.4.1.1	Demonstrate understanding of the concept of energy, its various forms and sources and the ways in which it can be transformed and conserved.	B5.4.1.1.1 Explain how energy is transformed from one form to another. B5.4.1.1.2 Know how to use electricity efficiently in the home.
B5.4.1.2	Show understanding of the concept of heat energy in terms of its importance, effects, sources and transfer from one medium to another.	B5.4.1.2.1 Show the relationship between heat and temperature. B1.4.1.2.2 Measure and record temperature using thermometer .

SUB-STRAND
1

SOURCES AND FORMS OF ENERGY

4.1.1.1 HOW ENERGY IS TRANSFORMED FROM ONE FORM TO ANOTHER

Keywords

Sources	Energy	Transformation	joules (J)
Chemical energy		Conversion	Converted

Introduction

Think-pair-share

In our previous classes we learnt about energy and different forms of energy. In pairs, discuss and share what you remember.

Energy can be defined as the ability to do work.

Energy is measured in joules(J).

Every one of us needs energy to perform various activities. We need energy to walk, talk, cook, carry things, play football and read our books.

Machines, cars, trains and airplanes also need energy before they can work.



We need energy to play



We need energy to read

Where does energy come from?

Human beings like us get our energy from the food we eat. Cars and other vehicles get their energy from fuel.

There are different forms of energy that are used in different ways.

Examples of some forms of energy are heat energy, light energy, electrical energy, chemical energy, sound energy and solar energy.



Chemical energy from food keeps us active always

How energy is transformed from one form to another

All the forms of energy can be changed or converted from one form to another. The process by which energy can be changed or converted from one form to another is known as **energy transformation**.

The Law of Conservation of energy states that: energy can neither be created nor destroyed, but can be changed from one form to another. For example, an electric bulb converts electrical energy into light energy and heat energy. This is what we mean by conversion of energy.



Now, let us look at some more examples of how we can change energy from one form to another.

Change of energy from one form to another

1. Conversion of chemical energy into light and heat energy

Chemical energy is stored within items such as battery or dry cell, food, wood and fuel. Chemical energy in batteries can be converted into light and heat energy.

Let us demonstrate how chemical energy can be converted to other forms of energy.

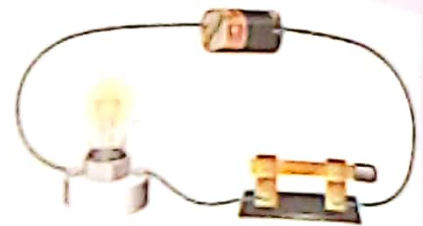
Activity 1.1 Converting chemical energy stored in a dry cell to light and heat energy

Materials needed: A bulb, a switch/key, a dry cell, a piece of copper wire.

Steps to follow

Note: Activity should be done under the supervision of your facilitator.

1. Connect a piece of copper wire to a dry cell and a bulb in series as shown.
2. Close the key and observe the bulb. Did the bulb light up?
3. Wait for about 10 minutes and touch the bulb. Is the bulb hot?



Discussion

When you close the key, the bulb lights up. After a short time, the bulb becomes hot. This indicates that the chemical energy in the dry cell is first converted to electrical energy. The electrical energy changes to light energy and then to heat energy.

Chemical energy → **electrical energy** → **light energy + heat energy**

This shows that the chemical energy in the battery has been converted into light and heat energy.

2. Conversion of chemical energy into sound energy

Let us demonstrate how chemical energy in a battery can be converted to sound energy using battery, speaker and connecting wires.

Activity 1.2**Producing sound from electrical energy**

Materials needed: A door bell or speaker, battery, switch, connecting wires.

Note: Activity should be done under the supervision of your facilitator.

Steps to follow

1. Connect in series a circuit of a door bell or speaker, battery, a switch and connecting wires.
2. Close the switch and observe what happens.
3. Again, open the switch and observe what happens.

Discussion

In this activity, you will observe that when the switch is closed a sound is produced. This sound is produced because the chemical energy in the battery first changed into electrical energy and the electrical energy changed to sound energy.

3. Conversion of electrical energy into heat energy

When an iron is connected to a source of electricity, the iron becomes heated. This shows that the electrical energy has been converted to heat energy.



Some other examples of energy conversions that take place in the following activities are:

1. **When a television set is switched on**
Electrical energy \rightarrow light energy + sound energy + heat energy.
2. **Lighting a candle.**
Chemical energy \rightarrow light energy + heat energy
3. **Switching on a torch.**
Chemical energy \rightarrow electrical energy \rightarrow light energy + heat energy
4. **Burning wood or gas.**
Chemical energy \rightarrow light energy + heat energy

CLASS DISCUSSION

Discuss energy transformations that take place in the following activities.

1. Ringing of bell
2. Beating of gong-gong
3. Drumming

INDIVIDUAL ASSIGNMENT

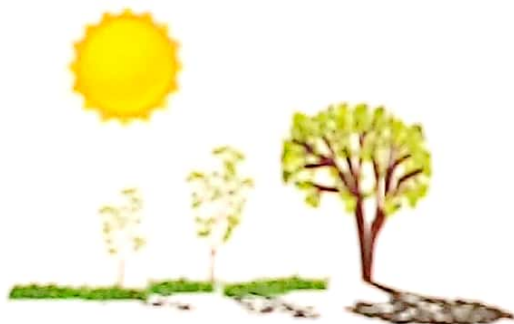
Design a flow chart to explain how energy from the sun is transformed into energy for walking.

GROUP ASSIGNMENT

In groups, identify other forms of energy transformations in the school community and present your findings for class discussion.

TEST YOUR UNDERSTANDING

Discuss the different types of energy transformations that take place in each of the pictures.



A



B



C



D



E



F

4.1.1.2 EFFICIENT USE OF ELECTRICITY IN THE HOME

Keywords

Efficient Conserve Electricity Conservation 'Dumsor'

Introduction

Electricity is a very important form of energy we use in our daily lives.

Think of all the items in your home that use electrical energy. Television, fridge, pressing iron, light bulbs and fan.

We watch fun programs and news on television. We switch on the light to help us see clearly when our room is dark. We iron our uniforms and other clothes using the pressing iron.

What other items in your home use electricity? How do you use these items?



In this lesson, we shall learn how to use electricity efficiently in the home. Using electricity efficiently is a way of conserving electrical energy.

Electricity conservation refers to the wise use of electrical energy without wasting it.

How is electricity wasted?

In Ghana, the electricity we use in our homes is generated from two major sources. These are hydro (water) and thermal (heat). We waste electrical energy coming from these sources in many different ways. For example, leaving our lights and other appliances on when we are not using them.

When we waste electricity, we are likely to experience power crises or power outages. A few years ago, Ghana experienced a series of power outages locally referred to as '**dumsor**'. 'Dumsor' affected a lot of homes, schools, businesses and factories. Most companies had to close down and a lot of people lost their jobs.

It is important for us to conserve electricity in order to help our nation from future power outages. If we are able to use electricity in our homes and schools efficiently, there will always be a supply of electricity. There are several ways we can conserve electricity. Let us look at some of the ways we can conserve electricity.

Ways we can conserve electricity

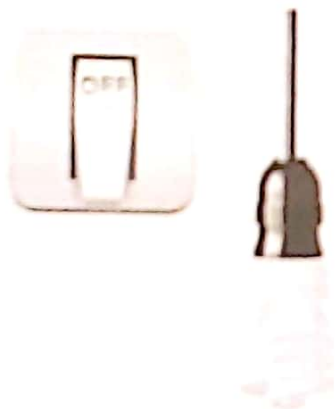
1. Iron all your uniforms and clothes in bulk for the week.



2. Avoid leaving the doors of fridges and deep freezers opened.



3. Turn off all lights when they are not in use.



4. Use appliances with good energy rating. Such appliances do not consume a lot of electricity. The more stars the appliance has the less energy consumption.



5. Avoid loading and putting hot foods in fridges and deep freezers.



6. Switch off fans and air conditioners when the weather is cold. Open windows to let in fresh air during the day.



7. Avoid using old and faulty electrical appliances. They consume a lot of electricity.



8. Close all doors and windows when you turn on air conditioners.



9. Use energy saving bulbs.



10. Switch off all electrical appliances such as micro-waves, electrical irons, television sets and fans when they are not in use.



THINK-PAIR-SHARE

Identify how you will use electricity efficiently in the home, community and school. Share your findings with your facilitator.

FUN SECTION

GROUP WORK

Group 1: Create posters and compose a song on electricity conservation.

Group 2 : Role-play a door to door education on how to use electricity wisely.

Group 3: Role-play radio and television adverts educating the community on electricity conservation.

CLASS PRESENTATION

Give a short presentation on how you will help solve power crisis in the community in which you live.

TEST YOUR UNDERSTANDING

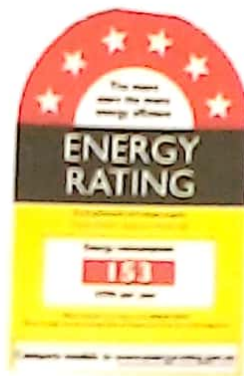
BRAINSTORM

Play these cards. The stars on the cards represent the consumption rate for appliances.

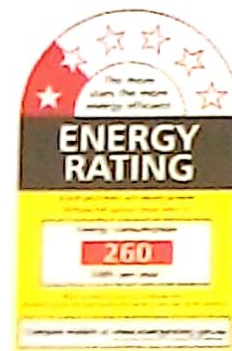
1. Re-arrange the cards according to their efficient use of power.
Give reasons for your arrangement.



1



2



3



4



5

2. Your younger brother always leaves his play station, fan, television and other electrical gadgets in his room on any time he is going out. As a result of that, the electricity bill at the end of every month is very high. With your knowledge on electricity conservation, what advice will you give to your younger brother to reduce the cost of electricity at the end of every month?

3. Lately, your Dad has not been happy because of the huge amount of money he spends on electricity. Anytime he buys prepaid power, it takes less than two days and it gets finished. As a smart child, you and your siblings had a great plan. You decided to make your Dad happy by making sure that all appliances are turned off when they are not in use so that the high cost of electricity will reduce. Although your plan had worked, the cost of electricity was still high. You suspected the high cost of electricity could be caused by other factors.
- Apart from putting off your appliances when they are not in use, what other ways can you conserve electricity?
 - When do appliances consume more electricity than they are supposed to?
 - Assuming your father wants to buy new appliances, what are some of the things you will tell him to consider in order to save energy and avoid high electricity bill?

4.1.2.1 RELATIONSHIP BETWEEN HEAT AND TEMPERATURE

Keywords

Relationship Temperature Substance Heat Degree Transfer

Introduction

Group discussion

In groups, discuss what will happen when heat is applied to a substance and what will happen when heat is lost from the same substance.

For example when you place a cup of water in the sun, what will happen to it?

What happens when the same cup of water is taken from the sun and put into a fridge? Share your thoughts with the class.

When you place a substance in the sun for a while, the substance becomes hot. When the substance becomes hot, it means the substance has gained heat. When you put the same substance in a fridge, it will become cold. This means that the substance has lost heat.

When an object is heated, the temperature of the object rises and when the same object loses heat, its temperature falls.

Heat and temperature are closely related but they are not the same. You can only tell the temperature of an object if the object is hot or cold.

- **Temperature** is the measure of degree of hotness or coldness of a body or a substance. Temperature is measured in **Kelvin**.
- **Heat** is a form of energy that is transferred from a substance of a high temperature to a substance of a low temperature. Heat is measured in **joules(J)**.



Relationship between heat and temperature

Activity 1.3 To find out what happens when heat is applied to a substance

Materials needed: metal plates or piece of stone.

What to do:

Caution: Perform this activity under the supervision of your facilitator.

1. Place objects such as a metal plate or a piece of stone in the sun.
2. Before you put the object in the sun, touch it to feel its degree of hotness.
3. After 20 minutes, touch the object again. Do you feel any difference in the temperature?
4. Now place the stone or metal plate in a bowl of water. After a few minutes, touch the object again. Is it hot or cold?
Share your observation.

Class discussion

You will observe that when you placed the metal plate or the piece of stone under the sun, it became hot. This means that the temperature of the object has risen. When you took the object and placed in a bowl of water, it became cool. This means that the temperature of the object has fallen.

When an object is heated, the temperature of the object rises and when the same object loses heat, its temperature falls.

In summary, when heat is lost, temperature reduces and when heat is gained, temperature increases.

Perform this activity at home and share your observation

Join your mum in the kitchen as she is cooking.

With your mum's permission, sit close to the coal pot or stove.

Precaution: Do not get too close to the fire or touch the fire.

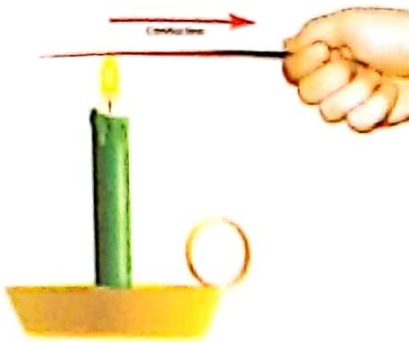
How do you feel when you sit close to the coal pot or the stove?

Share how you feel with your mum.

TEST YOUR UNDERSTANDING

PRACTICAL KNOWLEDGE

1. Study the pictures below carefully and answer the questions that follow.



A



B



C



D

- Describe the relationship between heat and temperature in diagram A.
- In Picture B, explain why a cone of ice cream will melt on a sunny day but will change back to its original iced form when put into a freezer.
- In Picture C, Ama and Yaa are both roasting pieces of meat. Ama is using a wooden stick while Yaa is using a metal rod. Explain why Yaa cannot hold her metal rod but Ama is able to hold her stick.
- In Picture D, explain why the handle of the cooking saucepan is covered with plastic.

2. State 3 differences between heat and temperature.

4.1.2.2 MEASUREMENT OF TEMPERATURE USING THERMOMETER

Keywords

Temperature Thermometer Improvised Celsius Scale
Degree Celsius Digital Analogue Thermometric liquid Kink

Introduction

Have you ever observed a nurse taking the body temperature of a sick person in the hospital before?

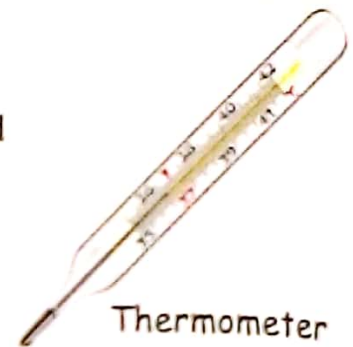
Have your parents taken your body temperature at home before?

What instrument did they use?

How did they use this instrument?

In this lesson, we shall learn about an instrument called thermometer and how it is used.

Thermometer is an instrument that is used to measure the temperature of a body.



Thermometer

Before we begin the lesson, let us perform an activity to learn how to make our own improvised thermometer.

Activity 1.4 How to produce improvised thermometers

Materials needed: Plastic bottles, transparent plastic straw, dye, water, rubbing alcohol, marker and play dough.



Steps to follow

Note: Perform this activity under the supervision of your facilitator.

1. Pour an amount of tap water and rubbing alcohol into the plastic bottle until it is a quarter full.
2. Add a few drops of red food colouring (dye), and shake the bottle to mix well.
3. Insert the straw into the bottle and make sure the straw does not touch the bottom of the bottle.
4. Wrap a modeling clay or a play dough around the top of the straw to seal the bottle. Mould the clay over the opening in the bottle to make it airtight.
5. Look for the liquid level inside the straw and use a permanent marker to draw a line on the bottle.

This is how you can make your own thermometer.



The instrument used to measure the amount of heat in the body

The instrument used to measure the temperature of a body is the **thermometer**. Temperature can be measured in **degree Celsius** or **degree Fahrenheit**.

There are different types of thermometers. The most common ones used are:

1. Clinical thermometer and
2. Laboratory thermometer

The clinical and the laboratory thermometers can be either **digital** or **analogue**.

Digital clinical thermometer

A digital clinical thermometer shows the temperature of a body that is measured in figures. The figures appear on the screen of the thermometer as shown in the picture.

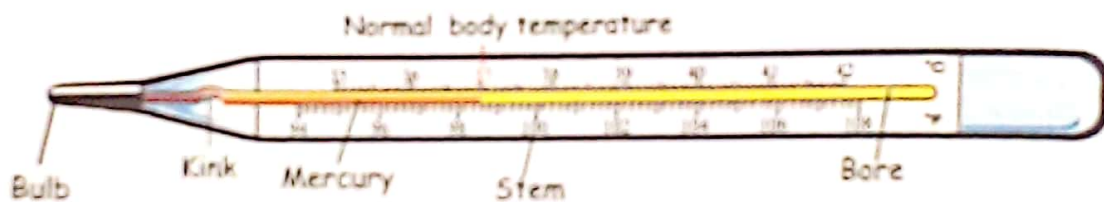


A infrared digital thermometer showing a reading of 37.2°C



A digital thermometer showing a reading of 37°C

Analogue clinical thermometer



Can you tell the reading on the analogue clinical thermometer? The reading is **37°C**.

The analogue clinical thermometer is used by doctors and nurses at hospitals, clinics and other health centers. Our parents sometimes keep one of these thermometers in the home to monitor the temperature of our body.

The analogue clinical thermometer has a bulb that contains mercury.

The mercury in the bulb is called **thermometric liquid**. It also has a thick glass tube called a stem and a special part called the **kink**.

The analogue clinical thermometer is marked from 35°C to 42°C on the stem. These markings are called **graduations**.

The average normal body temperature of a person is 37°C on the Celsius scale and 98.4°F on the Fahrenheit scale.

If the body temperature of a person is higher than 37°C , it means that the person may be ill.

Let us perform some activities to know how to use the analogue and digital clinical thermometers to measure and record the temperature of a body.

Activity: 1.5 How to use the analogue clinical thermometer

Materials needed: Analogue clinical thermometer, cotton and antiseptic or disinfectant.

Caution: Perform the activity under the supervision of your facilitator.

What to do: Work in pairs.

Steps to follow

1. Wash the thermometer with the antiseptic solution before use.
2. Make sure the temperature reading on the thermometer is below 35°C . If it is not, shake the thermometer until it is below 35°C .
3. You can now go ahead and put the thermometer under the armpit or in the mouth of your partner for about one minute.
4. Remove the thermometer from the mouth or the armpit of the person.
5. You can now take the temperature reading on the graduation.



How to use the analogue clinical thermometer

Activity: 1.6 How to use a digital clinical thermometer

Materials needed: clinical thermometer, cotton and antiseptic.

Steps to follow

Caution: Perform the activity under the supervision of your facilitator.

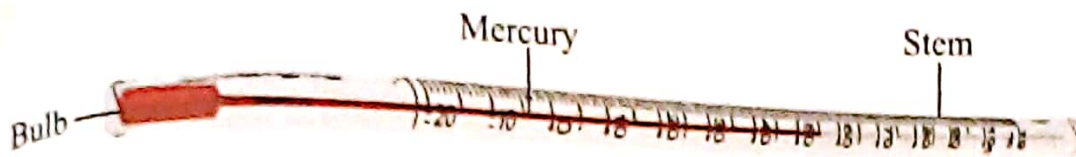
1. Before you use the thermometer, you need to clean it very well with an antiseptic.
2. After cleaning the thermometer, press the button on the thermometer to reset the digital number on the thermometer to **0:0**.
3. Put the thermometer under the tongue or in the mouth as shown in the picture. You can also put the thermometer in the armpit and hold the arm gently against the body.
4. Wait until you hear the beeping sound of the digital thermometer.
5. Remove the thermometer and record the number displayed on the screen. The number displayed is the body temperature of the person.

**GROUP WORK**

Work in groups. Each group should choose a group nurse.

1. The group nurse should measure the body temperature of each person in the group.
2. He or she should record the temperature reading of each person in the group.
3. Groups should discuss the body temperature they have recorded.

The Analogue Laboratory Thermometer



The analogue laboratory thermometer also has a long stem and a mercury bulb or reservoir but it does not have a kink. It is marked from a negative figure to a positive figure. That is from -20°C to 120°C .

The laboratory thermometer can be used to measure the temperature of a substance in the laboratory. For example, it can be used to measure the temperature of a liquid substance and other substances or objects. The fundamental freezing point of water is 0°C and the boiling point is 100°C .

To take the reading on a laboratory thermometer, the mercury bulb is placed close to the substance or inside the substance. The mercury thread rises up the stem when the temperature is high and falls when the temperature is low.

Let us perform an activity to know how to use the analogue thermometer to measure and record the temperature of a warm water.

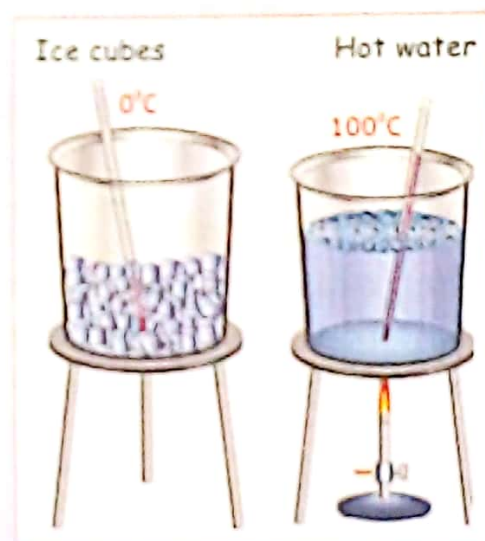
Activity 1.7 How to use analogue laboratory thermometer

Materials needed: ice cubes, two beakers, Bunsen burner, analogue thermometer.

Steps to follow

Caution: Perform the activity under the supervision of your facilitator.

1. Observe the calibration and record the initial temperature of the thermometer.
2. Dip the thermometer into a beaker containing some ice cubes.
Record the temperature reading.
3. Using the Bunsen burner, heat the ice cubes to melt and become hot.
4. Dip the thermometer in the beaker containing the hot water.



What is the temperature reading of the hot water?

Observation

You will observe that the temperature reading has fallen to 0°C when you dipped the thermometer in the ice cubes.
However, when the ice is heated and the thermometer is dipped into the hot water, the temperature rises to 100°C . This is the temperature at which water boils. The mercury thread rises up the stem at this point.

What are the differences between an analogue clinical thermometer and an analogue laboratory thermometer?

- The differences between an analogue clinical thermometer and an analogue laboratory are shown in the table below.

Laboratory thermometer	Clinical thermometer
1. The temperature reading ranges between -20°C and 120°C .	The temperature reading ranges between 35°C and 42°C .
2. It has a long tube.	It has a short tube.
3. It has no kink on the tube.	It has a kink.
4. It is used in laboratories to measure temperature of substances.	It is used to measure body temperature.

GROUP PROJECT

In groups, produce your own improvised thermometers using plastic bottles, plastic straws, dyes, play dough and water.

TEST YOUR UNDERSTANDING

PRACTICAL KNOWLEDGE

1. Daniella has caught cold and she has a fever too. You touched her body and realised her body is very hot.
 - a. What instrument will you use to measure the degree of hotness of her body?
 - b. After taking her temperature, it reads 39°C . Assuming you are a nurse or a doctor, explain the temperature reading to Daniella's mother.

2. Your junior brother is not feeling too well. Your mother is checking his body temperature as shown in the picture. Looking at the picture, can your mother tell the correct body temperature of your brother by just using her hand? Explain your answer.

3. What steps will you follow when taking the body temperature of a person?



RIDDLE, RIDDLE I

1. I am a substance in a form of a liquid. I can be seen in an analogue clinical thermometer as a thermometric substance. **WHO AM I?**

2. I am a type of thermometer marked from 35°C to 42°C on the stem. I can be used by nurses and doctors to measure the temperature of patients. **WHO AM I?**

3. I am the only unit of measurement of temperature on the Celsius scale. **WHO AM I?**



Key points to remember

1. The process by which energy can be changed or converted from one form to another is known as **energy transformation**.
2. **Electricity conservation** refers to the wise use of electricity without wasting it.
3. When an object is heated, the temperature of the object rises and when the same object loses heat, its temperature falls.
4. We define temperature as **the measure of degree of hotness or coldness of a body or a substance**.
5. There are different types of thermometers. The most common ones used are:
 - Clinical thermometer and
 - Laboratory thermometer

SUB-STRAND 2: ELECTRICITY AND ELECTRONICS

By the end of this sub-strand, the learner will:

CONTENT	STANDARD	INDICATORS
B5.4.2.1	Demonstrate knowledge of generation of electricity, its transmission and transformation into other forms.	B5.4.2.1.1 Identify the components of an electric circuit and their functions.

SUB-STRAND

2

ELECTRICITY AND ELECTRONICS

4.2.1.1 COMPONENTS OF ELECTRIC CIRCUIT AND THEIR FUNCTIONS

Keywords

Electronics

Components

Circuit

Electric circuit

Introduction

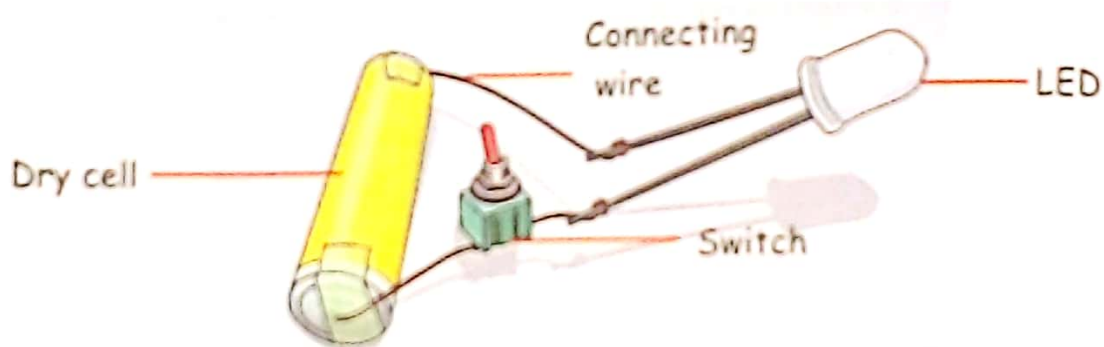
What comes into your mind when you hear the term **electric circuit**?

In our previous class, we learnt about electricity.

We learnt that before electricity can make anything work, it needs to move through some materials. One of the materials electricity can move through is a wire. When you connect a wire to a battery, electricity flows through the wire and this makes appliances work.

To know if electricity moves through a wire, you will need to build a simple circuit to perform this activity.

Look at the diagram below. This is a constructed simple electric circuit.



A simple electronic circuit

Electric circuit is a way or path through which electricity flows. The electricity that flows through an electric circuit is called **electric current**.

An electric circuit has components (parts) that make the circuit work.

The components of a simple electric circuit are: 1. Connecting wire 2. Battery 3. Dry cell 4. Switch 5. LED 6. Bulb

1. Connecting wires

Connecting wires connect the various parts used in the circuit. The wire allows electricity to flow through the circuit. A wire is made from copper metal but it is always covered with a plastic material. The plastic material is used to prevent people from getting electric shock.



Connecting Wire

2. Battery/dry cell

The battery is the part of the circuit that provides electrical energy to the circuit. A battery is formed from two or more cells connected together.

There are different types of batteries we can use in a simple circuit. Without the battery, the circuit will not work. A battery has two ends. These are the positive (+) end and the negative (-) end.

The difference between a cell and a battery is that a cell supplies power for a shorter period of time but a battery can supply power for a long period of time.



Dry cell

Battery

3. Switch

A switch is a device that is used to control the circuit. The switch can also be called a key. If you want the circuit to be on or off, you use the switch/ key. When the switch is opened (switched off), electricity cannot flow through the circuit. When the switch is closed (switched on) electricity flows through the circuit.



switch

4. Light emitting diode(LED)

Light emitting diode is also known as LED. LED is a device that gives light when electricity passes through the circuit. LED is not the same as bulb. LED use small amounts of electricity. An example of LED is the christmas light which goes on and off.



LED

5. Bulb

The bulb also gives light when electricity flows through the circuit.



Bulb

Activity 2.1

Observing parts of the electric circuit

Things needed: Different types of batteries, LED or bulb, connecting wires, a switch/ key.

What to do:

Note: Perform the activity under the supervision of your facilitator.

Study the various components or parts of a circuit one after the other.

1. Take different types of batteries and observe the two ends.

Do you see the positive (+) sign mark and the negative (-) sign mark on the battery?

2. Take the LED and observe it. Does it look like a bulb?

3. Take the switch. Look at it very well.

Press the switch on and off.

4. Take the connecting wires. Is the copper metal wire covered with a plastic wire?

ASSIGNMENT

Visit www.youtube.com

Watch pictures and videos of simple electrical circuits and how they work.

Share what you observe with the class.

How to construct a simple electrical circuit

Activity 2.2

To construct a simple electrical circuit

Things needed : A battery with a holder, LED or a bulb with a holder, a switch, a flat wooden board and a wire.

Caution: Perform the activity under the supervision of your facilitator.

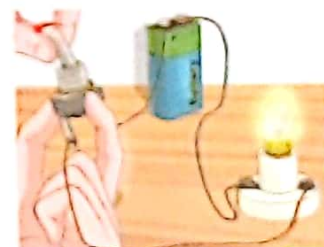
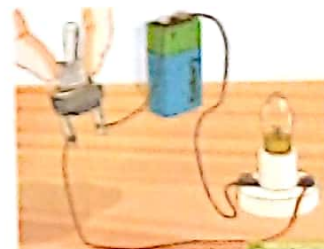
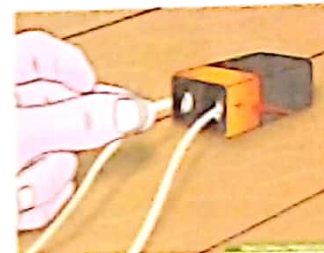
Steps to follow:

1. Connect the wire to the positive terminal of a battery and then to the bulb. Extend the same wire to the negative terminal of the same battery.
2. Fix the various holders on the flat wooden board as shown.
3. Connect the wire from the switch to the bulb and another wire from the positive terminal of the battery to the bulb.
4. Fix the whole set-up in the various holders on the board.
5. Close and open the switch.

Observation and discussion.

You will observe that, when you close the switch the bulb/LED lights up and when you open the switch the bulb/LED goes off.

Follow these steps



GROUP ACTIVITY

In groups, construct simple electric circuits using connecting wire, dry cell and a bulb or LED.

Present your work for exhibition.

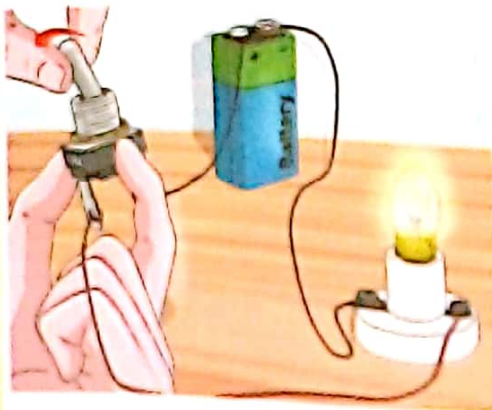
Which other materials can you use in place of dry cells, connecting wires and a bulb?

PROJECT: Build a LED lantern using the above circuit and a plastic bottle.

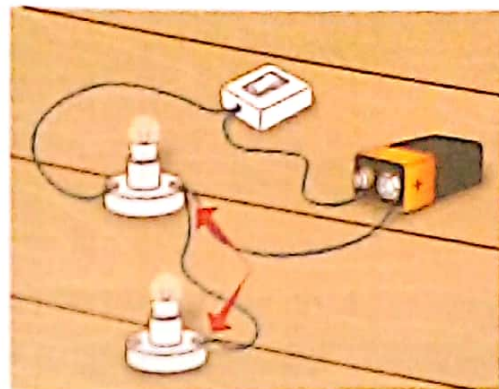
TEST YOUR UNDERSTANDING

PRACTICAL KNOWLEDGE

Study the two circuit diagrams below carefully and answer the questions that follow.



A



B

1. Explain why the bulb in circuit **A** is lighted but the bulbs in circuit **B** are off?
2. In circuit **B**, which part of the circuit will make the bulbs light?
3. Which part of the circuit provides chemical energy in circuit **A**?
4. Which part of the circuit provides light energy in circuit **A**?
5. What is the name of the part that connects the bulb to the battery and to the switch? Why is this part covered with a rubber material?
6. After sometime, you will realize that the lighted bulb in circuit **A** is hot. Briefly explain why the lighted bulb is hot.
7. Mention some of the things you will do to make sure that you protect yourself from getting shocked when working with circuit connection.



Key points to remember

1. **Electric circuit** is a way or path through which electricity flows.
2. The electricity that flows through an electric circuit is called **electric current**.
3. An electric circuit has components (parts) that make the circuit work.
The components of a simple electric circuit are:
1. Connecting wire 2. Battery /dry cell
3. Switch 4. LED 5. Bulb
4. A battery has two ends. These are the positive (+) end and the negative (-) end.

SUB-STRAND 3: FORCES AND MOVEMENT

By the end of this sub-strand, the learner will:

CONTENT	STANDARD	INDICATORS
B5.4.3.1	Know that movement is caused by applied forces due to the release of stored energy.	B5.4.3.1.1 Explain the term, "friction", its effects and applications.

SUB-STRAND
3

FORCES AND MOVEMENT

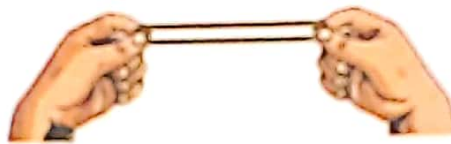
4.3.1.1 "FRICTION", ITS EFFECTS AND APPLICATIONS

Keywords

Force Movement Friction Lubrication Frictional force

Introduction

Look at the pictures below carefully.



Application of force

Can you explain what is happening in the pictures?

Do you remember what we learnt on forces in our previous class?

Give some examples of different types of forces and how they are applied.

A force is defined **as a push or a pull on objects.**

Force causes objects to move in various ways. Before we can apply force to cause an object to move, we need to use energy. We get energy from the food we eat. Cars, other vehicles and machines get energy from fuel.

Force can be applied in many ways. It can be used to make an object move fast or move slow or even stop. Force can be used to attract other objects. It can also be used to stretch, press or squeeze objects.

The force applied on an object can be measured in newton (N).

There are different types of forces. Some types of forces are elastic forces, compressional force, frictional force and magnetic force.

In this lesson we will learn about **frictional force**. We shall learn how friction is applied and the effect it has on objects.

Frictional force

- What is frictional force?
- What does it do?
- How does it work?

Frictional force is a force that is created when two surfaces move against each other. When two objects rub against each other, force of friction reduces the movement of the two surfaces.

Perform this activity with your friend

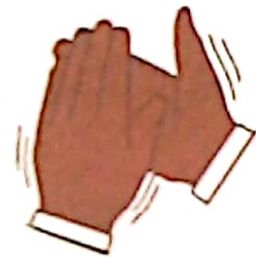
Rub your hands together for several seconds as shown in the picture.

"How does your palm feel?"

Share your observation with your friend.

When you rub your palms together, your palms become warm. The warmth you feel in your palms is caused by a force called **friction**.

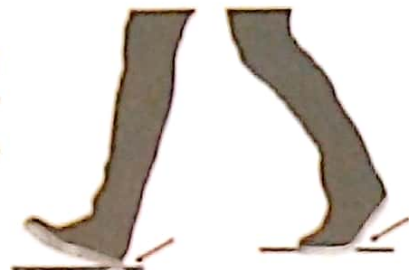
Force of friction **reduces the movement** between two objects rubbing against each other. This makes the palm become warm.



Uses/advantages of friction

Frictional force helps us in so many ways. Some uses and advantages of frictional force are:

1. Friction between our shoes and the ground helps us to walk freely without slipping. Friction holds our shoe to the ground allowing us to walk. Imagine how difficult it will be to walk on a slippery floor where there is little or no friction.



2. Cars, bicycles and wheelchairs are able to move because of the friction between the tyres and the ground. Without friction the tyres would just spin.



3. We cannot hold a pen in our hand without friction. Friction prevents pens and other things from slipping out when we try to hold them to write or draw.



4. Friction helps us to sharpen tools such as hoe, cutlass, axe and knife.



5. Friction also helps machine parts to move.



Other examples of friction we experience in our everyday life

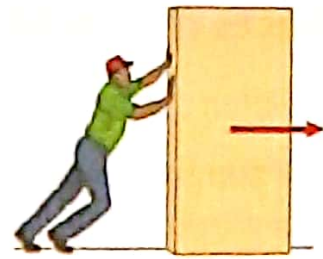
Have you rubbed two stones together before? What happened when you rubbed them together? Did it spark up fire?

1. Friction causes fire to start when you rub two stones together.



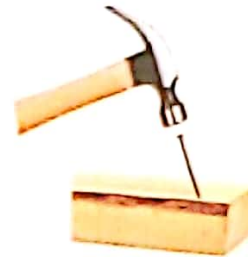
Rubbing two stones together

2. When you push a box along the ground, friction occurs between the bottom of the box and the ground. Frictional force reduces the movement of the two surfaces that are in contact with each other.



Friction occurs between the box and the ground

3. When you use a hammer to hit a nail into a piece of wood, friction occurs between the wood and the sides of the nail.



Friction occurs between the wood and the nail

Brainstorm

1. Why do cars drive slowly on roads during rainy days?
2. What will happen if a person accidentally steps into an oil spill on the floor?

1. On a rainy day, the surface of the road becomes smooth and slippery. The water on the road reduces the friction between the tyres and the road. When this happens, the tyres of the car are not firmly gripped to the ground. This is the reason why drivers usually drive slowly on rainy days in order not to skid off the road.



Rainy day

2. When one accidentally steps into an oil spill on the floor, the person will slip. This is simply because friction on that part of the floor has reduced. This makes the person's foot not firmly gripped to the ground.



Man slipping

Effects of friction/Disadvantages of friction

1. Friction causes car tyres to wear off.

Have you tried moving a toy car on a rough and smooth surface before?

What did you observe?

To know the effect friction has on objects, let us perform an activity using toy cars.

Activity 3.1 To demonstrate the effect of friction on objects

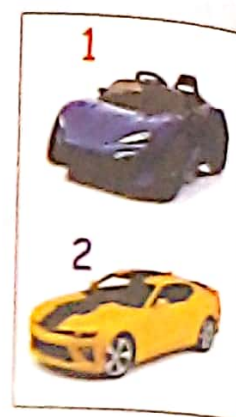
Materials needed: Two toy cars

What to do: Perform this activity in pairs

1. Move the two toy cars on two different surfaces at the same time. One on a smooth surface and the other on a rough surface.

Which car won the race?

Discuss your observations with each other.



Discussion

You will observe that **Car 1** moved slowly on the rough surface but **Car 2** moved faster and smoothly on the smooth surface. This happened because, on a rough surface, the friction between the tyres and the ground is high. This slowed the movement of **Car 1**. On a smooth surface, the friction between the tyres and the ground is low. This is why **Car 2** was able to move faster.

You will also observe that at the end of the race, the surface of the tyres of **Car 1** have become rough. This shows that friction between the tyres and the rough surface can make the tyres wear off. But on a smooth surface, the tyres will not wear off.

2. Friction causes the sole of shoes and tyres to wear off or even tear.



3. Rubbing eraser on a paper wears out the eraser due to friction.



4. Friction produces a lot of heat in machines. It also causes machine parts to wear off.



Ways or methods to reduce friction

1. Oiling or greasing surfaces (surfaces made from metals). This is also known as **lubrication**.



2. Using rollers or ball bearings at movable parts of machines.



3. Polishing or smoothening surfaces.



4. Using powder to clean surfaces.



Think-pair-share

Brainstorm and share with your partner why a kicked football moves fast for sometime and slowly comes to a stop.



TEST YOUR UNDERSTANDING

PRACTICAL KNOWLEDGE

A. Use the pictures below to answer the questions that follow.



A



B



C

1. Picture A: Explain why a moving tennis ball reduces in speed.
2. Picture B: Explain why some parts of the sole of a shoe is protected with metals.
3. Picture C: Your Dad's car has broken down. Some parts of the car have rusted and cannot move. Advise your Dad on what he can do to always keep his car parts moving.

B. Observe the pictures below carefully.

It is a rainy day. The driver of **car A** is driving at a high speed but the driver of **car B** is driving slowly and cautiously.

1. Which of these two cars is likely to **skid off** the road and why?



A



B



Key points to remember

1. A **force** is a push or pull on objects.
2. Frictional force is a force that reduces the movement of two surfaces that are in contact with each other.
3. Frictional force helps us in so many ways. Friction between our shoes and the ground helps us to walk freely without slipping.
4. One effect of friction is that it causes the sole of our shoes and lorry tyres to wear off.
5. We can reduce friction by oiling or greasing surfaces (metal surfaces).

STRAND 5

HUMANS AND THE ENVIRONMENT

SUB-STRAND 1: PERSONAL HYGIENE AND SANITATION

SUB-STRAND 2: DISEASES

SUB-STRAND 3: SCIENCE AND TECHNOLOGY

SUB-STRAND 4: CLIMATE

SUB-STRAND 1: PERSONAL HYGIENE AND SANITATION

By the end of this sub-strand, the learner will:

CONTENT STANDARDS	INDICATORS
B5.5.1.1 Recognise the importance of personal hygiene.	B5.5.1.1.1 Know why it is important to wash clothes regularly.
B5.5.1.2 Identify, discuss and appreciate the natural and human features of the environment and the need to keep the environment clean.	B5.5.1.2.1 Know how to keep washrooms clean. B5.5.1.2.2 Demonstrate how to clean the environment regularly.

SUB-STRAND
1

PERSONAL HYGIENE AND SANITATION

5.1.1.1 IMPORTANCE OF WASHING CLOTHES REGULARLY

Keywords

Hygiene Personal hygiene Infection Bacteria

Introduction

Class discussion

How well do you keep yourself clean?
Discuss and share with your class.

Personal hygiene is a way of keeping our body clean in order to avoid contracting sicknesses and diseases.

In this lesson, we shall learn how to observe personal hygiene by keeping our clothes clean.

Look at these clothes and underwear. Which of these would you wear?



Dirty clothes



Clean clothes

It is important to keep our clothes and underwear clean. When we keep our clothes clean it keeps germs away from us. Clean clothes also make us look neat, bold and smart. When we wear dirty clothes, we can easily contract skin diseases. We also smell bad when we wear dirty clothes.

To keep our clothes clean, we must wash them with clean water and soap regularly.

Do you know how to wash your clothes? As a child you need to learn how to wash your own clothes. You can start by learning how to wash your under wears, socks and handkerchiefs.

Think-pair-share

Discuss with each other what items are needed to wash your clothes and underwear. Share your thoughts with the class.

Items needed for washing clothes

To wash your clothes, you will need items such as soap (washing powder and a bar of soap), water and a big bowl or bucket.



Soap



Washing powder



Bowl



Bucket of water

READ AND DISCUSS

Kofi and Ama were asked one Saturday to wash their own dirty clothes. They were both excited to wash their own clothes for the first time. Kofi started by first putting all his clothes into a bowl.

He poured water on the clothes and then started washing them without soap.

Kofi squeezed the water from the clothes and hung them to dry.



Kofi and Ama washing

Ama on the other hand started by first pouring water into a bowl. She then added some soap (washing powder) to the water. She put the clothes in the water and started washing.

She rinsed and squeezed the clothes and threw the water away.
She poured another water in the bowl for a second wash.
After that she rinsed and squeezed the clothes and hung them to dry.

Between Ama and Kofi who washed the clothes well?
Ama washed her clothes better than Kofi.

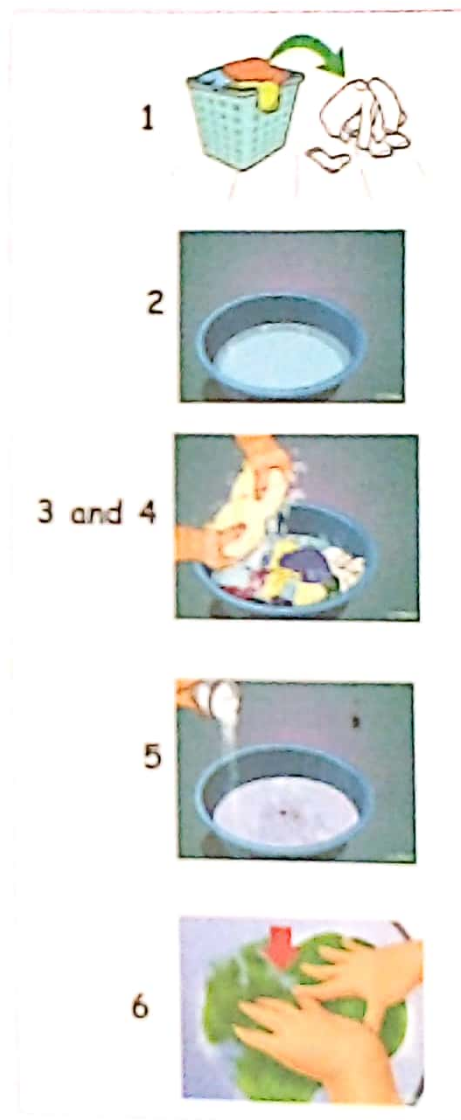
To learn how to wash well, let us follow the steps in the activity below.

Activity 1.1 How to wash our clothes

Things needed: soap, dirty clothes, a bucket or a bowl and some amount of water.

What to do

1. Separate the white clothes from the coloured ones.
2. Pour water into a bowl.
3. First, rinse all the clothes one after the other without soap.
4. Pour the water away and fetch another water into the bowl.
5. You can now add some washing powder to the water. Mix the soap and the water with your hand to lather well.
6. Dip the clothes into the water.



7. You can now begin to wash the clothes.
8. Hold the ends of the clothe and rub them together. The armpit and the neck areas.
9. Hold up the clothe and check if there are stains in it.
10. Rub the stains to remove them if there are any.
11. Wring out the water from the clothe.
12. Rinse the clothe in a clean water.
13. Check if the clothe is clean.
Squeeze the water out and dry it on the line under the sun.
- Repeat these steps for all the clothes.
14. When the clothes are dry, iron and fold them nicely.

7 and 8



9



10



11



12



13



14



PROJECT

Design a personal roster for washing your clothes. On the roster, indicate the days and times you will use to wash your dirty clothes.

TEST YOUR UNDERSTANDING

ORAL TEST

1. Share with a friend what will happen if you don't wash your clothes and underwear regularly.
2. Kofi has one school uniform. Kwabena on the other hand, has four uniforms. Although Kofi has just one uniform, his uniform is always clean and he always smells good. Kwabena who has four uniforms always looks dirty and he also has a body odour.
 - a. How is Kofi able to keep his clothes always clean having only one uniform?
 - b. Why does Kwabena have a body odour?
 - c. What can Kwabena do to keep his uniforms clean?

Note: Kofi does not use perfume.

5.1.2.1 HOW TO KEEP WASHROOMS CLEAN

Keywords

Washroom Lavatory Flushing Waste bin

Introduction

Take a look at the lavatory on your right. Isn't it beautiful and clean? In this lesson we shall learn how to keep the washrooms clean.

Before you use any lavatory, you must make sure it is clean. Both inside the bowl and outside it. To clean the lavatory, you will need some detergents and a toilet brush. You can use a broom and a mop to clean the floor.

You must always make sure there is tissue paper in the washroom. If there is no tissue paper, do well to carry one along.

Whether you are in the washroom to take a poop or to urinate, you have to do it **directly into the bowl**. **Never stand or squat on the bowl** unless the bowl is designed for people to squat on it.

You must not forget to wipe after a poop or when you urinate. It will always keep you clean and fresh.

Flushing: Never forget to flush after using the washroom.

When disposing off used tissues, **drop it directly into the waste bin**. Avoid dropping tissue papers on the floor. It invites bacteria and other germs into the washroom. Used tissues papers must be removed from the washroom and disposed of regularly.

Finally, always wash your hands with soap and water anytime you visit the lavatory. This is very important.



Cleaned lavatory



Keep it clean always



Washing of hands

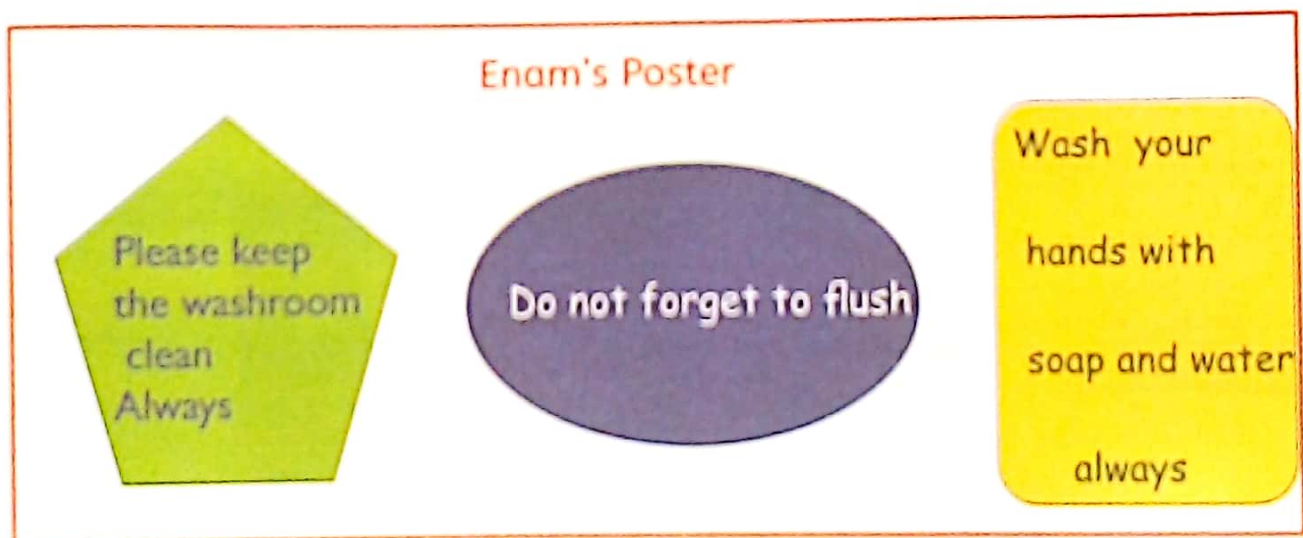
Think-pair-share

Discuss why it is not good to use a dirty washroom.

Risk of using a dirty washroom

- Dirty washrooms expose us to germs and bacteria that are harmful to our health.
- Dirty washrooms also attract animals like cockroaches, houseflies and even mice. We are likely to contract diseases such as influenza, cholera, dysentery and typhoid if these animals come into contact with our foods.
- Dirty washrooms are likely to smell very bad. If we do not keep our washroom neat and fresh they give off odour.
- We may experience urinary infections if we fail to keep our washrooms clean. It is very difficult to use a dirty washroom, sometimes you will rather not use it at all. Failing to ease yourself when you are pressed can affect your health. You may develop urinary diseases that can affect your health.

Look at the posters below. They were designed by Enam to be pasted in the school washroom. Design your own poster on a cardboard and paste them in your school washroom.



TEST YOUR UNDERSTANDING

Read the story below and answer the questions that follow.

THE STORY

In my school, we clean our washroom every Monday, Wednesday and Friday. There is a duty roster that guides each group and the day they are supposed to clean the washroom.

My name is Ama and I am in Group A. Everybody in my group participates in the cleaning of the washroom except Kwame.

Whenever it is our turn to clean the washroom, Kwame does not participate. He either runs away to hide or he does not come to school at all.

At home, I live with my father and younger brother who is just two years old. I do most of the house chores. Kwame lives with his grandmother who is very old and cannot do any cleaning.

QUESTIONS

1. From the story you have just read, which of these two learners do you think keeps a clean washroom at home? Explain your answer.
2. You are likely to suffer from some diseases if you use a dirty lavatory. Name some of these diseases and say which learner and his or her family are likely to suffer from any of the diseases you have mentioned.
3. Assuming Ama and Kwame are both having a party at their homes, which of the parties would you like to attend and why?
4. As a learner, what advice will you give to learners who make the lavatory dirty and do not clean it?



Learners cleaning the school washroom

5.1.2.2 HOW TO CLEAN THE ENVIRONMENT REGULARLY

Keywords

Environment Sanitation Liquid waste Solid waste Compound

Introduction

Look at the two pictures below.



A clean environment



A dirty environment

Which of these two environment is safe to live in and why?

The environment is everything around us.

Our school compound is an environment. Our room, our community, home and other places are all part of our environment. In order to stay healthy, we must keep our environment clean always.

Sanitation is a way of keeping our environment clean in order not to contract sicknesses and diseases.

Think-pair-share

Pair up with your friend and discuss some reasons why we should keep our environment clean.

Germs live in dirty and unclean environment. These germs cause many diseases and sicknesses. If we do not keep our environment clean, we can easily fall sick. If we keep our environment clean, we will live a good and healthy life. As learners, what do you do to keep your home and school clean?

POEM

Clean your school and community
Pledge to clean each corner and edge.
Enhance the school's beauty; dispose of garbage wisely
Set an example for the next generation
Dispose of the waste at a proper place
Adopt the three Rs: Reduce, Reuse, Recycle.

Tools used for cleaning the environment

What is the first thing you do when you get to school?

Do you clean your school compound? How well do you clean it?

There are many things we can do to keep our compounds clean.

Let us look at some tools used for cleaning our home and school compound.



Dust pan



Scrubbing brush



Rags



Dustbin



Brooms



Ceiling brush



Cutlass



Shovel

Correct way of using the cleaning tools

Sweeping

We use **brooms** for sweeping our home and school compound. Sweeping makes our compounds clean. After sweeping, we use the dust pan to collect the rubbish from the floor. Remember to wear a nose mask when sweeping a dusty compound to avoid catching cold.



Sweeping

Mopping

Mopping is done by wiping the floor with **water, soap and a rag or a mop**. We normally mop tiled floors and cemented floors. Mopping helps to keep the floor clean and sparkling.



Mopping

Weeding

Weeding is a method of cutting down grasses and removing unwanted plants from the compound. Weeding prevents animals such as snakes, rats and mosquitoes from hiding in the weeds. We use **cutlasses and hoes** to weed our compounds.



Weeding

Dusting

When we use **clean rags** to remove dust from things, we call it dusting. Dusting keeps our things clean all the time. Always remember to wear a nose mask when dusting to avoid catching cold.



Dusting

Scrubbing

Scrubbing is done to remove stains and dirt. We use the **scrubbing brush**, water and soap to scrub our bathhouse, toilet and other places.



Scrubbing

Cleaning the ceiling

We use the **ceiling brush** to remove cobwebs from the ceiling and corners of the walls. This makes the ceiling clean.



Cleaning the ceiling

Cleaning the gutters

We clean our gutters to remove rubbish, sand and other wastes that are collected in them. A **shovel** and a **long broom** can be used to clean a gutter. Cleaning our gutters allow free flow of water in them. It removes bad smell from the gutters and also prevents mosquitoes from breeding in them.



Cleaning the gutters

Activity 1.2 Showing ways of keeping our environment clean

Things needed: Gloves, nose masks, a broom, a brush, a mop, a cutlass, a hoe and a rake.

What to do:

Work in groups

Caution: You must use nose masks when sweeping or dusting.

1. Group yourselves into three.

Group 1 should clean the compound.

Group 2 should clean the washroom.

Group 3 should clean the classroom.

2. Groups should use the methods and tools for keeping the compound clean.

3. Compare the surrounding before cleaning and after cleaning.

Your facilitator will inspect your work and announce the group that cleaned well.

Project

Design posters to create awareness on the need to keep the school, home and community clean and exhibit your work in the school.

LEADERSHIP BUILDING

Take a step to form sanitation club In your class after this lesson.
You can discuss your idea with your facilitator to guide you succeed.

FUN SECTION

In groups compose a song on cleanliness.
Each group should present their song to the class by singing.

TEST YOUR UNDERSTANDING

In your community there are two playing grounds for children. Almost all the children in the community prefer going to Park A and not Park B.



A



B

1. Give reasons why most of the children in the community like Park A?
2. What dangers are the children in the community likely to experience if they visit Park B?
3. What kind of tools are needed to clean Park B?
4. Draw and colour the tools you have mentioned.



Key points to remember

1. **Personal hygiene** is a way of keeping our body clean in order to avoid contracting sicknesses and diseases.
2. When we keep our clothes clean it keeps germs away from us.
3. Sanitation is a way of keeping our environment clean.
4. When you are in the washroom to take a poop or to urinate, you have to do it directly into the bowl.
5. Dirty washrooms expose us to germs and bacteria that are harmful to our health.
6. Germs live in dirty and unclean environments. If we keep our environment clean, we will live a good and healthy life.

SUB-STRAND 2: DISEASES

By the end of this sub-strand, the learner will:

CONTENT STANDARD	INDICATORS
B5.5.2.1 Know common diseases of humans; causes, symptoms, effects and prevention.	B5.5.2.1.1 Explain the causes, symptoms and control of chicken pox. B5.5.2.1.2 Identify causes, symptoms and prevention of cholera.

**SUB-STRAND
2**

DISEASES

5.2.1.1 CAUSES, SYMPTOMS AND CONTROL OF CHICKEN POX

Keywords

Diseases Chicken Pox Symptoms Contagious
Virus Infectious Vaccine Dehydration

Introduction

Chicken pox is a contagious disease that is caused by a virus.

What are contagious diseases?

Contagious diseases are diseases that spread from one person to another through body contact.

Symptoms of chicken pox

1. Severe headache.
2. Itchy skin.
4. Fever.
5. Loss of appetite.
6. In some cases, a feeling of nausea.
7. Swollen bumbs/rashes.



Chicken pox disease

What will you do to prevent being exposed to chicken pox?

The best way to protect oneself from getting chicken pox is to get a chicken pox vaccine. Chicken pox vaccine is very safe and effective at preventing a person from getting infected with chicken pox.



Vaccination

Ways of preventing chicken pox from spreading

1. Avoid contact with an infected person.
2. Avoid sharing of towels, clothes and other common items in the home.
3. Avoid living in overcrowded rooms.
4. Observe personal hygiene.

Treatment

1. Have a cool bath with water mixed with baking soda (salt). After bathing, apply Calamine lotion on the whole body. This will reduce the itching.
2. A person infected with chicken pox must avoid scratching his or her body to expose the rashes. This will help prevent the disease from spreading easily to other people.
3. Avoiding dehydration (water loss). It is important to drink plenty of water and juice to prevent dehydration when you have chicken pox.



Drink more water

Project:

Develop a concept map to trace the causes, symptoms and prevention of chicken pox.

TEST YOUR UNDERSTANDING

CLASS PRESENTATION

There is an outbreak of chicken pox in your community. Your headmaster believes that just educating the learners in your school will not help minimize the spread of the chicken pox disease.

Your headmaster selected you and two other learners in your school to educate the people of the community on chicken pox. The education must include the following:

- (1) Causes of chicken pox.
- (2) Symptoms of chicken pox.
- (3) What should be done if one is exposed to chicken pox.
- (4) Ways chicken pox can be prevented.

Give a short presentation to your class on the kind of education you will give to the community on chicken pox disease.

5.2.1.2 CAUSES, SYMPTOMS AND PREVENTION OF CHOLERA

Keywords

Causes Symptoms Prevention Infectious Bacterium
Diarrhoea Dehydration Transmission Contaminated

Introduction

Cholera is an infectious disease that is caused by a bacteria. Cholera affects people of all ages.

Mode of transmission of cholera

Cholera is transmitted through drinking contaminated water or eating contaminated food.



Contaminated water



Contaminated food

Symptoms of cholera

1. Severe vomiting.
2. Severe passage of watery stool (diarrhoea).
3. Dehydration caused by passage of watery stool and vomiting.
4. General body weakness.



Vomiting

Prevention of cholera

1. Avoid drinking dirty water. Always drink treated water.



2. Avoid eating cold food. Heat food before eating.



3. Wash fruits and vegetables well before cooking and eating them.



4. Wash your hands properly with soap and water after visiting the toilet and before eating.



5. Cover foods and water to prevent houseflies, cockroaches and other insects from settling on them.



6. Isolate infected persons .



TEST YOUR UNDERSTANDING

PICTURE DESCRIPTION

Look at the pictures below carefully.
Use the pictures provided to answer the questions that follow.



A



B



C



D



E



F

1. What causes cholera?
2. What will happen when someone contracts cholera?
3. What should be done if someone has cholera?
4. What do you do to prevent cholera?



Key points to remember

1. One way to avoid chicken pox is to get vaccinated with the chicken pox vaccine.
2. We can prevent chicken pox from spreading if we stop sharing our personal items like towels and clothes. We must also avoid living in overcrowded rooms.
3. Cholera is transmitted through drinking contaminated water or eating contaminated food.
4. To avoid cholera, you must always wash your hands properly with soap and water after visiting the toilet and before eating. You must also eat food and drink water that is not contaminated.

SUB-STRAND 3: SCIENCE AND INDUSTRY

By the end of this sub-strand, the learner will:

CONTENT	STANDARD	INDICATOR
B5.5.3.1	Recognise the impact of science and technology in society	B5.5.3.1.1 Identify the raw materials used in some local industries (kenkey production, gari production, ceramic and pottery production) .

SUB-STRAND
3

SCIENCE AND INDUSTRY

5.3.1.1 RAW MATERIALS USED IN SOME LOCAL INDUSTRIES

Keywords

Industry Raw material Local industry Small scale industry
 Production Processing Potter Carpentry

Introduction

In our previous classes, we learnt how technology has helped us in so many ways. We learnt how technology has improved our means of transportation, communication, business, teaching and learning. We also learnt that with the help of technology, we can process most of our raw materials into finished goods for our consumption.

Places where raw materials are processed into finished goods are called industries. There are three types of industries. These are **Large Scale Industries**, **Medium Scale Industries** and **Small Scale Industries**.

In this lesson, we shall learn about small scale industries and the raw materials they use in processing their goods. These industries are referred to as **local industries**.

Group discussion

1. Do you know some local industries in your community?
2. Can you mention some of these industries?
3. What goods do these industries produce? Discuss and share with your class.

Some examples of common local industries in our communities are:

- | | | |
|---------------------------|--------------------|---------------------------|
| 1. Kenkey Production | 2. Gari Production | 3. Pottery Production |
| 4. Basketry Making | 5. Carpentry | 6. Shea butter Production |
| 7. Cooking oil Production | 8. Soap Making | |

Let us look at the raw materials used in some of these local industries and how they are used.

1. Kenkey production and the raw materials used

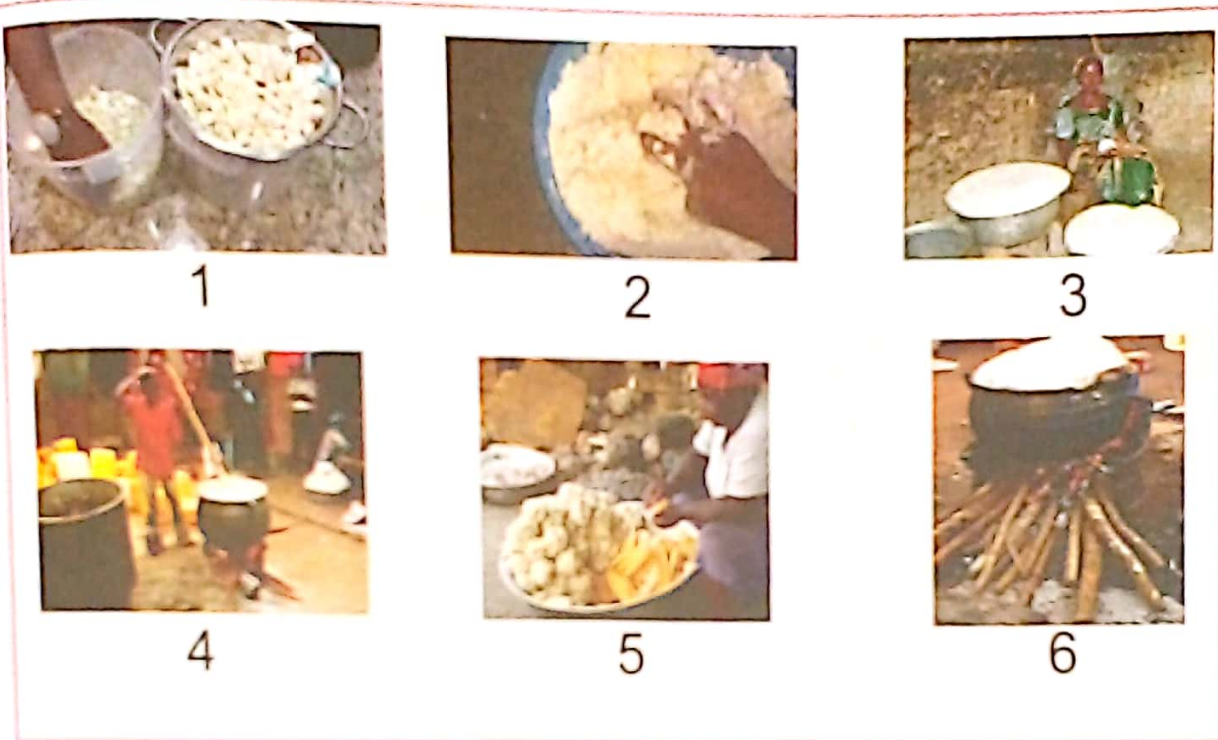
Kenkey is a staple food eaten in the southern parts of Ghana, especially among the Gas.

Preparation of kenkey takes more than a day.

Raw materials used in making Kenkey

Corn and corn husk

Processes involved in kenkey production



Kenkey can be eaten with pepper and fish.

2. Gari processing and the raw materials used

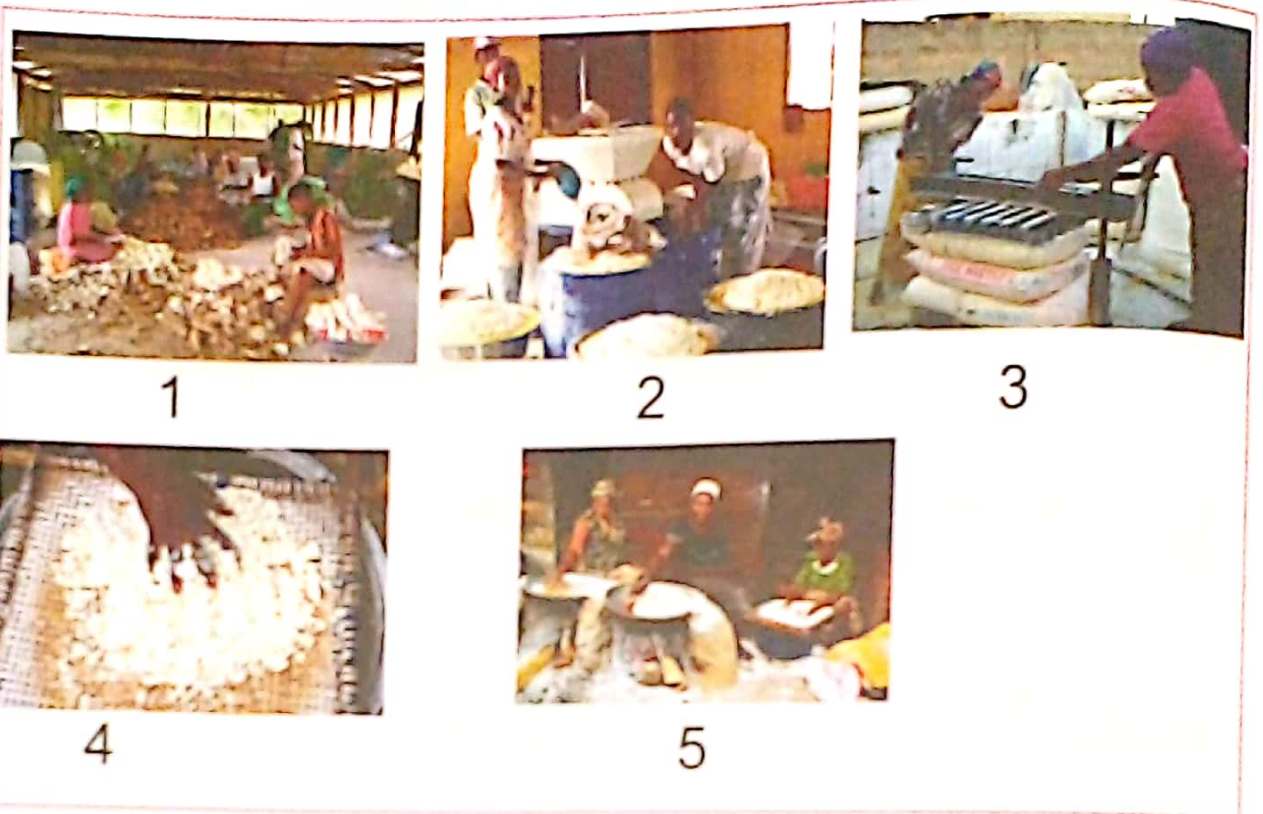
Gari is a creamy-white substance made from cassava.

Raw material used in making Gari
Cassava



Gari

Processes involved in Gari making



Gari can be used to prepare gari soakings, gari fortor, or 'ebar'.



Gari soakings



Gari fortor



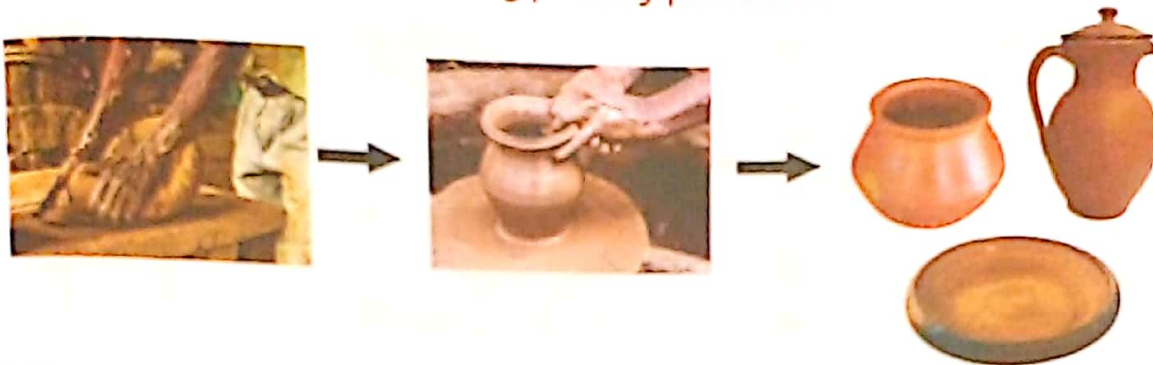
Ebar

3. Pottery production

Pottery is a clay that is moulded into different shapes. A professional who makes pottery products is called a **potter**. Some examples of things that are made from clay are earthenware, seed pot, stoneware, flower vase, wedding vase, bowls and cups.

Raw material used in making pottery products
Clay

Processes involved in making pottery products

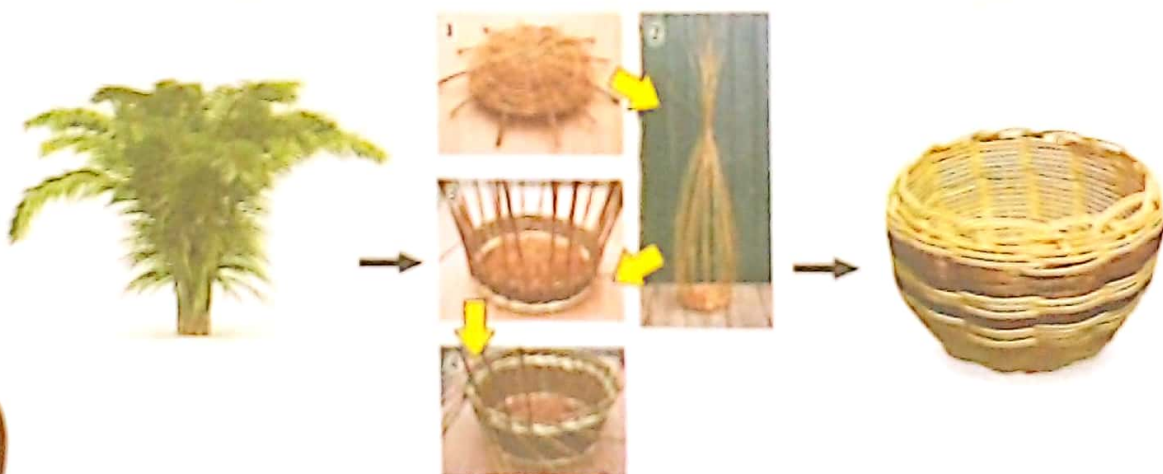


4. Basketry production

Basketry are products made by weaving flexible materials like raffia palm tree and a cane. Basketry products can be woven into different shapes and sizes.

Raw materials used in basketry making
Raffia palm tree and cane.

Processes involved in making basketry products

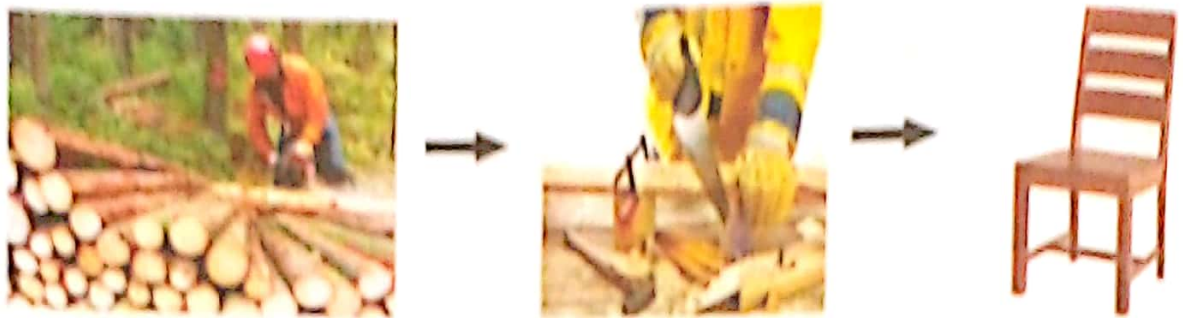


5. Carpentry

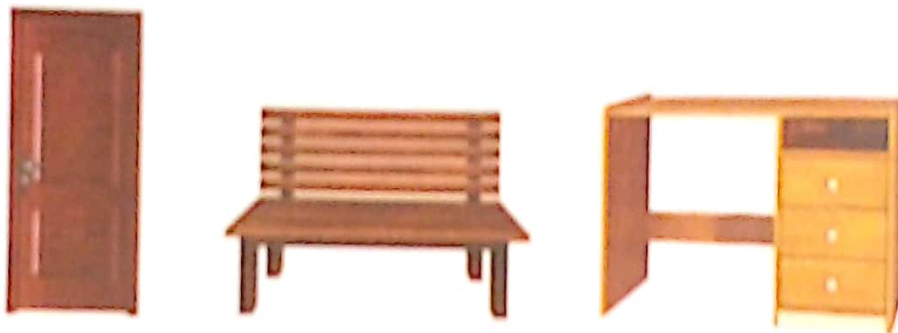
Carpentry products are products made by using wood from trees.
The person who makes carpentry products is called a **carpenter**.

Raw materials used in making carpentry products
Wood

Processes involved in making carpentry products



The carpenter makes items like tables, chairs, windows and doors.



Project: Designing an Industry.

Plan and design a factory in your locality showing the raw materials they use and the finished products.

TEST YOUR UNDERSTANDING






MATCHING ACTIVITY

You visited some local industries in your community to observe the kind of raw materials they use to produce various items. In a matching activity, match the products produced by these industries to the raw materials that are used to produce them.

PRODUCTS

- 1 
- 2 
- 3 
- 4 
- 5 

RAW MATERIALS

- A 
- B 
- C 
- D 
- E 



Key points to remember

1. Places where raw materials are processed into finished goods are called industries.
2. Small scale industries found in our communities are referred to as **local industries**.
3. Some examples of local industries in our communities are:
 1. Kenkey production
 2. Gari production
 3. Pottery production
 4. Basketry
 5. Carpentry
 6. Shea butter production
 7. Cooking oil production
 8. Soap making

SUB-STRAND 4: CLIMATE

By the end of this sub-strand, the learner will:

CONTENT STANDARD	INDICATOR
B5.5.4.1 Know that climate change is one of the most important environmental issues facing the world today.	B5.5.4.1.1 Identify the impact of deforestation on climate change.

SUB-STRAND
4

CLIMATE CHANGE

5.4.1.1 IMPACT OF DEFORESTATION ON CLIMATE CHANGE

Keywords

Climate
Sources

Deforestation
Formation

Environment
Transpiration

Introduction

Trees are very important in our environment. Most often, people cut down trees for different reasons without replanting them. When people cut down trees without replanting them it is known as **deforestation**.

Group discussion

In groups, discuss and share your ideas on the following:

1. How do you understand the term deforestation?
2. What is the importance of trees in the environment?

Look at the picture below. What can you say about it?



Deforestation

In this lesson, we shall learn about the importance of trees, and the impact of cutting down of trees in the environment.

Importance of trees in the environment

1. They are important sources of clean air

Trees breathe in carbon dioxide and breathe out oxygen. Carbon dioxide is one of the harmful gases released into the atmosphere through the burning of fossil fuels and waste materials. When trees breathe in carbon dioxide they absorb all the dirt in the air and release clean air (oxygen) which is needed by humans and animals.



Clean and fresh air from trees

2. Trees provide us with foods and medicines

Without trees, there will be no food for human beings and animals. Trees provide us with fruits. Also, some trees serve as herbs for curing diseases. The bark and leaves of most trees are used to prepare herbal medicines.



Trees give us food

3. Trees help in the formation of rainfall through a process called transpiration

The process by which plants lose water into the atmosphere is known as transpiration. This helps in the formation of clouds that later fall as rain. Rain water is used by humans to do so many things.

What other things can rain water be used for?



Trees cause rain to fall.

4. Trees provide us with shade and fresh air

Trees are good sources of natural shade. They reduce the direct contact the sun rays have with our skin. Their leaves also release water vapour into the atmosphere which keeps the air cool.



Trees provide us with shade

5. Trees serve as a home for most animals

Trees serve as very important habitats for many animals. Birds, monkeys and some other animals live in trees for shelter.



Think-pair-share

Do you have an idea what will happen if people continue to cut down trees?
What will you do to stop people from cutting down trees?
Discuss and share your thoughts with each other.

Tree felling and clearing of vegetation are done for various reasons. People mostly cut down trees to get wood to produce furniture. Others also cut down trees to clear lands for farming. For others especially the construction companies, it is done to create space for construction of roads and buildings. These are all important to humans.



Deforestation

However, continuous cutting down of trees without replacing them can cause a lot of harm to us. There are short-term effects as well as long-term effects of deforestation.

Some short-term effects of deforestation are:

1. Deforestation affects the production of rainfall.
2. There is less supply of clean and fresh air when there are less trees.

Some long-term effects of deforestation are:

1. Cutting down of trees leaves large amount of carbon dioxide in the atmosphere which causes climate change.
2. Cutting down of trees leaves our lands bare and exposes us to dust. Dust is harmful to our health when inhaled.

Measures to stop people from cutting down trees

1. Government must implement existing laws that prevent people from destroying our forest.
2. Schools can form environmental protection clubs. The clubs will educate learners and the society on the need to protect our environment by growing more trees and grasses.
3. A law must be enforced on furniture industries and construction companies who cut down trees to produce their goods. They must make sure they plant one or two trees before they are allowed to cut down a tree.
4. Community leaders can also establish rewarding scheme. Rewards would be given to persons or groups who plant trees and grasses in their communities.

Always remember that when you save a tree, you save a life.

PROJECT

Let your parent, facilitator or an adult assist you to plant trees in your school environment and at strategic locations within your community.

Take very good care of the trees you plant and observe them as they grow to become mature trees.

CREATIVE SECTION

Create posters, poems and songs to make the people in your community aware of the dangers associated with deforestation.



Think about this: What will happen if there are no trees in the world?

TEST YOUR UNDERSTANDING



CLASS PRESENTATION

Deforestation has serious effects on human beings and the environment as a whole.

Discuss.



Key points to remember

1. When people cut down trees without replanting them it is known as **deforestation**.
2. Deforestation contributes to increase in the earth's temperature which causes a change in our climate.
3. When trees breathe in carbon dioxide, they absorb all the dirt in the air and release clean air (oxygen) which is needed by humans and animals.
4. Cutting down of trees leaves large amount of carbon dioxide in the atmosphere which affects climate change.

Always remember that when you save a tree, you save a life.