Excellence Series

SCIENCE

For

BASIC SCHOOLS

LEARNER'S BOOK 5

Francis Benjamin Appiah
Derrick Appiah

Excellence Publication &
Stationery Limited

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Content

Strand 1

DIVERSITY OF MATTER

Sub-Strand 1 — Living And Non-Living Things

Content Standard:

B5.1.1.1 Understand the physical features and life processes of living things and use this understanding to classify them.

Lesson 1: 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.

Lesson 2: Differences among things that are living, dead and things that have never been alive

LESSON 1:

LIFE PROCESSES OF LIVING THINGS (GROWTH, SENSITIVITY TO THE ENVIRONMENT, RESPIRATION AND EXCRETION)

Learning indicator.

1. Know the life processes of living things (growth, sensitivity to the environment, respiration and excretion).

Introduction

There are some things only living things can do. They are referred to as life processes. The seven life processes which every living thing has in common are movement, reproduction, sensitivity, nutrition, excretion, respiration and growth.

In this lesson we shall learn about growth, sensitivity to the environment, respiration and excretion as life processes.

Activity 1.0: Investigating the life processes of growth, sensitivity to the environment, respiration and excretion in living things.

What you need: Pictures or animated videos of different living things

What to do

1. Go on a nature walk and observe and identify various living and non-living things.
2. Find out what is common among living things and non-living things.
3. Observe how animals (birds, insects, reptiles, fish and mammals) are sensitive to light, sound and heat from the environment.
4. Observe how animals excrete, that is, remove waste in the form of sweat, urine and faeces from the body
5. Observe how animals grow from babies to adults.
6. Observe how animals respire, that is, breathe in and out air in the environment.
7. Observe how seedlings or young plants grow by watching seedlings of maize or okro grow to mature plant within a period of three months.
8. Touch a plant such as mimosa and see how it response to touch.
9. Watch pictures or animated videos of different living things (for example, birds, insects, trees, reptiles, mammals, and fish).
10. Identify the names of the living things from the video.
11. Observe a member of the group breathe air in and out to demonstrate respiration.

PROJECT: Observing growth of plants

What to do

1. Work in groups.
2. Plant a maize seed.
3. Put a long stick near a germinated maize seed.
4. Keep watering and maintaining the plant for a period of three months.
5. Measure the height of the maize plant or mark the height of the maize plant against the stick for a period of three months. Do you see an increase in height of the maize plant?
6. Present your report of plant growth to class after three months.

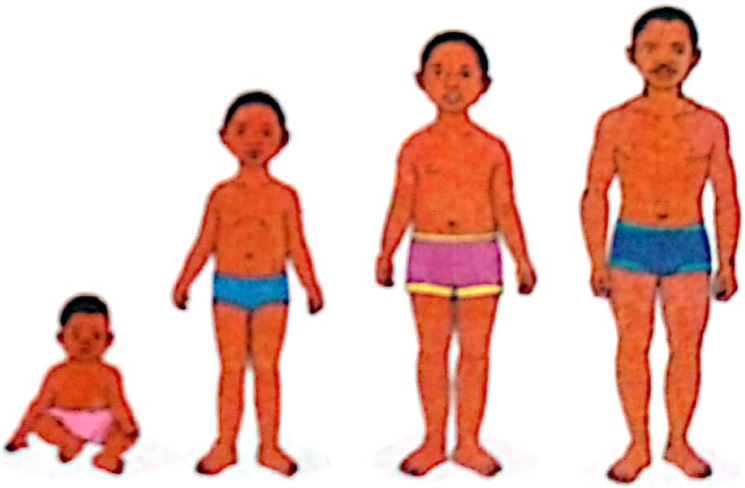
Life processes in living things

In the previous activity, we investigated life processes in terms of growth, sensitivity to the environment, respiration and excretion.

1. Growth

Growth is the ability of plants and animals to increase in size, weight and height irreversibly over a period. Animals grow from babies to adults. Plants grow from baby plants or seedlings to adult plants.

Seedling to matured plant



A baby through to adult man

2. Sensitivity to the environment

Plants and animals react or respond to changes in their environment. The changes in the environment include light, warmness and water. A plant like mimosa responds to touch by folding up its leaves.

Some plants and animals reacts to favourable changes by moving towards them but move away from unfavourable changes in the environment.

Animals respond faster to changes in the environment than plants.

3. Respiration

Respiration is a chemical process through which food substances are broken down within the cells or organisms with the release of energy.

The process includes breathing in air. Animals breathe air in and out as part of the respiration process. Plants respire by taking in air through the leaves.

4. Excretion

Excretion is the removal of metabolic waste substances from plants and animals. Some of the waste products from animals include sweat and carbon dioxide. Plants excrete oxygen as waste product of respiration through the leaves.

5. Nutrition

It is the process of obtaining the food necessary for health and growth.

6. Movement

Movement is the state of changing something's position.

7. Reproduction

Reproduction is the process whereby living things produce young ones of the same kind.

Important Things To Remember

- Some life processes of living things are growth, sensitivity to the environment, respiration and excretion.
- Growth is the ability of plants and animals to increase in size, weight and height.
- Plants and animals react or respond to changes in their environment.
- Respiration is the chemical process through which food substances are broken down within the cells or organisms with the release of energy.
- Excretion is the removal of metabolic waste substances from plants and animals.
- Nutrition is the process of obtaining the food necessary for health and growth.
- Movement is the state of changing something's position.
- Reproduction is the process whereby livingthings produce young ones of the same kind.

END OF LESSON EXERCISE

Answer the questions below

1) Name four life processes in plants and animals.
2) What is meant by growth in living things?
3) What is meant by response by plants to the environment?
4) Give an example of response by plants to the environment.
5) Name two excretory products of animals.
6) Name an excretory product of plants.

LESSON 2:

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

Learning indicator.

1. Compare the differences among things that are living, dead and things that have never been alive.

Introduction

We have a lot of materials around us. Some of the materials are living things. They can reproduce, move on their own and respire. Some materials are dead. They used to be alive. Example is firewood which is a dead plant. There are things which have never been alive.

Plastic and stone have never been alive.
In this lesson, we shall learn about the differences between living things, dead things and things which have never been alive.

Activity 1.1: Finding out the differences among things that are living, dead and things that have never been alive.

Materials needed: Pencil, paper, firewood, plastic, stones, sand, plants, insects, and protective clothes.

How to go about it

1. Work in groups.
2. Embark on a nature walk round the school compound.
3. Collect insects, ants, firewood, dry leaves, pencils, stones, water and soil.

   Caution: You must wear protective clothes when collecting the plants and animals.

4. Assemble all the items collected and observe them.

5. Sort the items collected into the following groups:
   i. Things that are alive
   ii. Things that were once alive (or things which are dead)
   iii. Things that have never been alive.

4. Compare the differences among things that are alive, once alive or never been alive.

5. Explain why learners are classified as living things.

Differences between living, dead and things that have never been alive

Living things can breathe, reproduce, eat, grow and move by themselves. Examples of living things are plants and animals.

Things that are dead were once alive. Examples are dry leaves, firewood.

Things that have never been alive have never eaten, breathed reproduced, grown or moved on their own. Examples of things that have never been alive are soil, metals, stone, water, glass and plastic.

Important Things To Remember

- **Living things** are things that can reproduce, grow, eat food (feed), excrete waste and move by themselves.
- **Dead things** are things that were once alive.
- **Things that have never been alive** are non-living things which have never reproduced, grown, eaten food and moved on their own.

END OF LESSON EXERCISE

Answer the questions below

1) Name four living things.
2) Name three materials which are dead.
3) Name three things which have never been alive.

4) A pencil is made from a material which has never been alive.
   a. True
   b. False
5) Water is a living material.
   a. True
   b. False

6) Plastics are materials which are dead. True or False

SUB-STRAND 2 — MATERIALS

Content Standard:

B5.1.2.1: Recognise materials as important resources for providing human needs

LESSON 3:

CLASSIFYING EVERYDAY MATERIALS BASED ON THEIR PROPERTIES

Learning indicator.

1. Classify everyday materials based on their properties (soft, hard, rough, smooth, opaque, transparent and bendable).

Introduction

There are many non- living materials in our environment. They may be in the form of wood, plastics, cotton wool, rubber, metal, paper, fabric, stone, glass, leather and sand. These materials have certain properties such as soft, hard, rough, smooth, opaque, transparent and bendable.

Activity 1.2: Investigating the properties of materials.

What you need: cotton wool, pieces of clothes, pieces of paper, cardboard, plastics, polythene bags (coloured and transparent), soil samples, marbles (rough and smooth), chalk, crayon, pen and straw.

What to do

1. Work in groups.
2. Assemble the materials provided.
3. Have a feel of the materials by touching them.
4. Group the materials based on texture, that is hard or soft.
5. Observe the materials and group them according to size (big or small).

6. Look through the materials, especially the polythene bags, and group them into those that we can see through (transparent) and those that we cannot see through (opaque).
7. Try and bend the materials and sort them into bendable and not bendable materials.
8. Feel the materials and group them as hard, soft and smooth.
9. Draw a material of your choice and present your drawings to class for exhibition and discussion.

PROJECT: Using different materials to create new items

What to do

1. Work in groups.
2. Use different materials to create new items such as paper fans, toy cars, toy planes, cooking pans, hats, earthenware pots and bowls.
3. Present your work for exhibition.

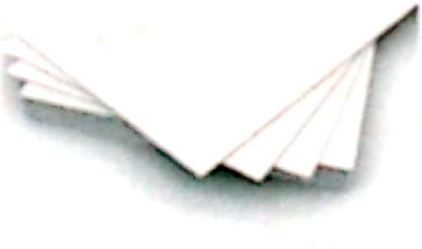
Some properties of materials

Materials have different properties such as soft, hard, rough, smooth, opaque, transparent and bendable.

1. Some materials are light and some are hard.

Cotton wool, pieces of paper and pieces of clothes are light.

Cotton wool

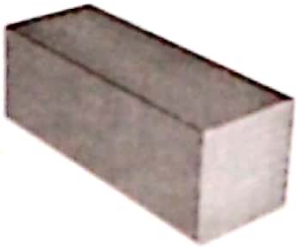


Pieces of paper

Pieces of clothes

2. **Stone, metal and wood are heavy**

Big Stone



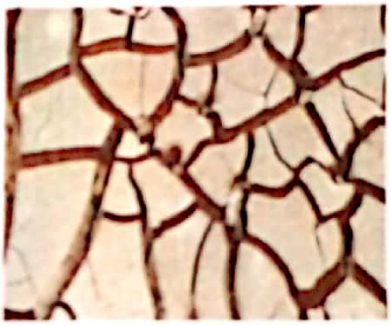
A Piece of metal

Wood

3. **Some materials are smooth.** Examples are glass, plastics and clayey soil.

Plastic bowl

Glass



Clayey soil

4. **Some materials are rough.** Examples are unpolished wood, sandy soil some stones or gravel.

Rough stone

Sandy soil

Wood

5. **Some materials are bendable.**
Examples are raffia palm and clay mould.

A man weaving a basket with rafia cane

A woman moulding a pot from clay

6. **Some materilas are transparent, that is, we can see through them.** An example is plain polythene.

Transparent Polythene

7. **Some materials are opaque, that is, we cannot see through them.**
Example is black polythene, wood and paper

Black polythene

Wooden board

Important Things To Remember

- Materials have different properties such as soft, hard, rough, smooth, opaque, transparent and bendable.

END OF LESSON EXERCISE

Answer the questions below

1) Name four properties of materials.
2) Give two examples of light materials.
3) Give two examples of smooth materials.
4) Give two examples of hard materials.
5) Give an example of a bendable material.
6) A stone is a soft material. True or False.

LESSON 4:

REVERSIBLE AND IRREVERSIBLE CHANGES

Learning indicator.

1. Know that some changes are reversible, while others cannot be reversed.

Introduction

Substances can undergo changes. There are two types of changes. These are reversible changes and irreversible changes. A reversible change does not lead to any new thing formed. An irreversible change results in a new thing formed. In this lesson, we shall learn about reversible and irreversible changes.

Activity 1.3: Finding out reversible and irreversible changes

What you need: Shea butter, candle wax, ice block, water, paper, a piece of wood, plastic, beakers, sauce pan, and a source of heat.

What to do

1. Work in groups.
2. Place ice block in a sauce pan and place it on a source of heat to melt the ice. What happens to the ice? Is a new thing formed different from the original water?
3. Pour the melted ice into a beaker and place it in a deep freezer for six hours.
4. Observe what happens to the frozen ice. Is it different from the original ice?
5. Melt a Shea butter and allow it to cool. Is there any new thing formed?
6. Melt candle and allow it to cool. Is any new thing formed?
7. Boil water and allow the vapour to touch a cool surface so that it condenses back to water. Is a new substance formed?
8. Crumple a piece of paper or aluminium foil.
9. Place it on a table and watch it spread. Is a new thing formed?

10. Burn a piece of paper. What happens? Is a new thing formed?
11. Take a plastic or firewood and burn it. What happens? Is a new thing formed?

REVERSIBLE CHANGES

A change in which no new substance is formed is called a **reversible change.**

Water kept in a freezer turns to ice. When the ice is removed and allowed to melt it changes to water. This is a reversible change. If water is boiled, it evaporates and becomes water vapour. When the water vapour cools down, it turns back to water. This is a reversible change.

When Shea butter is melted it changes to liquid. When the liquid Shea butter is allowed to cool it changes to the solid Shea butter. No new substance is formed.

Thus melting, freezing and boiling are all reversible changes.
Crumbling a paper is also a reversible change since no new substance is formed.

IRREVERSIBLE CHANGES

An irreversible change is a change which leads to a new thing being formed.

When a piece of paper or firewood is burnt, it turns to ash. It cannot become paper or firewood again. This is an irreversible change. It cannot be reversed at all.

Important Things To Remember

- A change in which no new substance is formed is called a **reversible change.**
- An irreversible change is a change which leads to a new thing being formed.

END OF LESSON EXERCICE

Answer the questions below

1) What is a reversible change?
2) Give two examples of reversible change.
3) What is irreversible change?
4) Give two examples of irreversible change.
5) Burning paper is a reversible change. **True or False**
6) Melting candle wax is a reversible change. **True or False**

LESSON 5:

FORMATION AND SEPARATION OF MIXTURES (SOLID-LIQUID AND LIQUID-LIQUID MIXTURES)

Learning indicator.

1. Demonstrate formation and separation of mixtures (solid-liquid and liquid-liquid mixtures).

A mixture is the physical combination of two or more substances. There are different types of mixtures. The substances which make up a mixture can be a combination of any of the three states of matter, that is, solid, liquid and gas. In this lesson, we shall learn about solid-liquid mixtures and liquid-liquid mixtures and how to separate the components.

Activity 1.4: Preparing solid-liquid mixtures and liquid-liquid mixtures

What you need: Water, sugar, salt, sand, chalk powder, beakers, spoon, kerosene, cooking oil, milk, soft drinks, vinegar

What to do

1. Work in groups.
2. Add water and salt in a beaker and stir.
3. Observe what happens to the mixture. What happens to the salt (solid)? What type of mixture is this?
4. Add sand to water in a beaker and stir.
5. Observe what happens to the mixture. Do you see the sand (solid) in the mixture? What type of mixture is this?
6. Add chalk powder and water in a beaker and stir the mixture.
7. Observe the mixture. What type of mixture is this?
8. Display different types of liquids, examples, water, kerosene, cooking oil, milk, soft drinks, and vinegar.

9. Identify the different kinds of liquids.
10. Mix liquids of the same kind, different kinds and then observe your findings, for example vinegar and water, and cooking oil and water and soft drink and water.

    Which of the mixtures are uniform?
    Which of the mixtures are not uniform?

SOLID-LIQUID MIXTURES

A solid-liquid mixture is the type of mixture where components are made up of solid and liquid substances. Examples include the following:

1. Sand and water mixture
2. sugar and water mixture
3. salt and water mixture
4. powdered chalk mixture
5. gari and water mixture

When a solid is mixed with a liquid and the solid disappears or dissolves in the liquid, the mixture is called a **solution.** The solid substance which dissolves or disappears is called a **solute** and the liquid is called a **solvent.**

When salt is mixed with water, the salt disappears in the water.

This mixture is called a **salt solution.**

The salt which dissolves or disappears is the **solute** and the water is the **solvent.**

In a situation where the solid particles suspend (float) in the liquid the mixture is called **suspension.** Example is powered chalk and water.

Methods of separating solid-liquid mixtures

There are methods for separating solid-liquid mixtures into the components. The methods include filtration, evaporation, decantation and sieving

1. Filtration

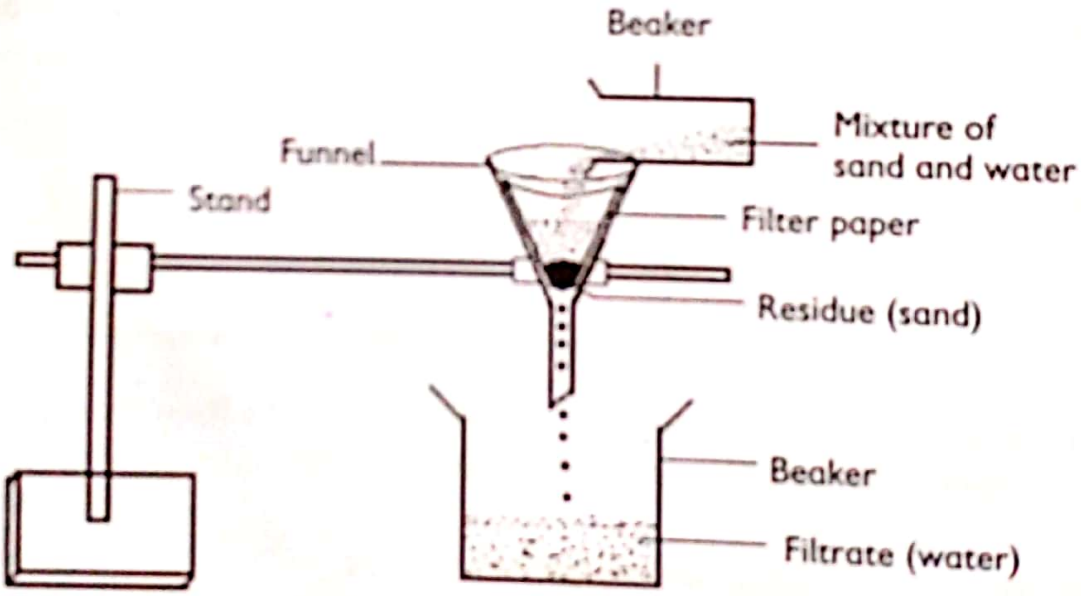
This is the method used to separate solid particles from liquids in a case where the solids do not dissolve in the liquid. An example of such mixture is sand and water mixture.

Activity 1.5: Separating a solid-liquid mixture using the filtration method

What you need: A funnel, filter paper, beakers, sand and water

What to do:

1. Work in groups.
2. Fold the filter paper in the form of a cone and place it in the funnel.
3. Hold the funnel and the filter paper in place with a stand and place a beaker under the tip of the funnel.
4. Gently pour the mixture of sand and water into the funnel.
5. Make sure that the mixture level does not rise above the filter paper in the funnel.
6. Leave the set up until all the water is finally drained.



7. Observe what is in the funnel and what is in the beaker.

The filtration method can only be used when one of the constituents cannot completely dissolve. Mixtures such as sand and water mixture, powdered chalk and water mixture and charcoal and water mixture can be separated by this method. In filtration, the mixture is poured into a funnel containing filter paper.

The water gradually drains and is collected in a beaker under the funnel. The particle left in the funnel is called the **Residue.**

2. Evaporation

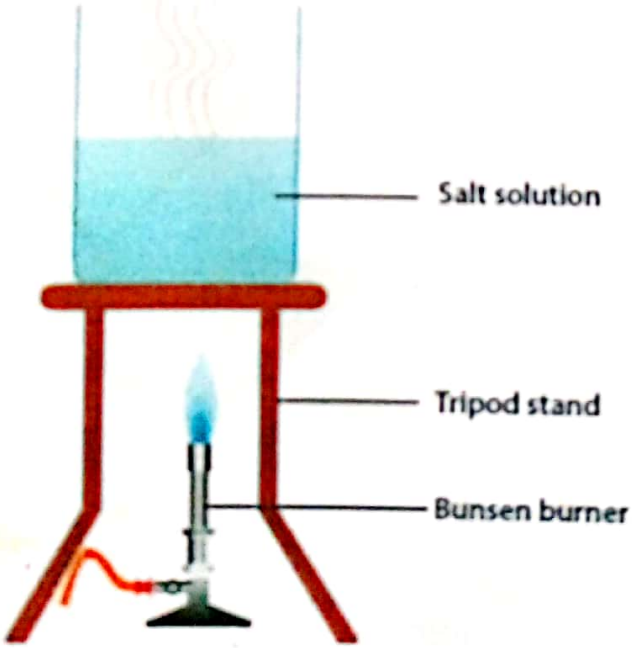
This is the method used to separate soluble solids from liquid in a solid-liquid mixture. In this case, the solid particles dissolve completely to form the mixture. Mixtures such as sugar solution and salt solution are separated by using this method.

Activity 1.6: Separating solid-liquid mixture by the evaporation method

What you need: Salt solution, tripod stand, evaporating dish, Bunsen burner or source of heat.

What you need

1. Work in groups.
2. Pour the salt solution into the evaporating dish and put it on the stand. Heat the set-up with the help of the Bunsen burner or source of heat.
3. Observe what remains in the dish after some time. Describe what remains in the dish.



During the heating, the water changes to vapour. What remains is salt. The evaporation method separates the dissolved solid from the solid-liquid mixture.

3. Decantation

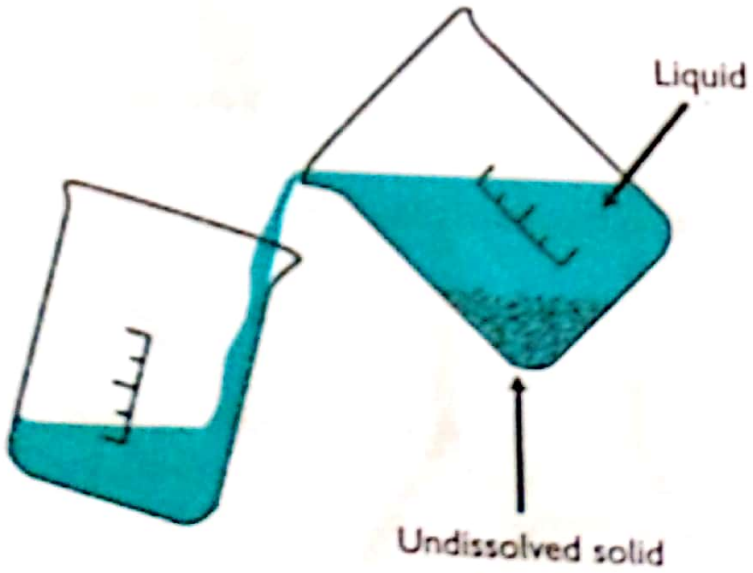
This is the method of separating mixtures where the liquid is poured from the insoluble solid particles without disturbing the mixture. The insoluble solid particles are allowed to settle at the bottom of the container. An example of such a mixture is that of chalk and water.

Activity 1.7: Separating solid-liquid mixture by the decantation method

What you need: Mixture of chalk powder and water, muddy water, two beakers.

What to do

1. Work in groups.
2. Prepare a mixture of chalk powder and water in a beaker.
3. Stir the mixture and allow it to stay undisturbed for about 30 minutes.
4. Look at the mixture. What do you see at the bottom of the beaker and what is at the top part?
5. Pour the top part of the mixture into the other beaker. What remains in the beaker?



The heavy chalk powder which does not dissolve in water settles to the bottom of the mixture and the water at the top is poured out. The chalk is then separated from the water.

4. Sieving method

This is the method used to separate large solid particles from liquids in a case where the solids do not dissolve in the liquid. An example of such mixture is small stones and water mixture or tea leaves and water mixture.

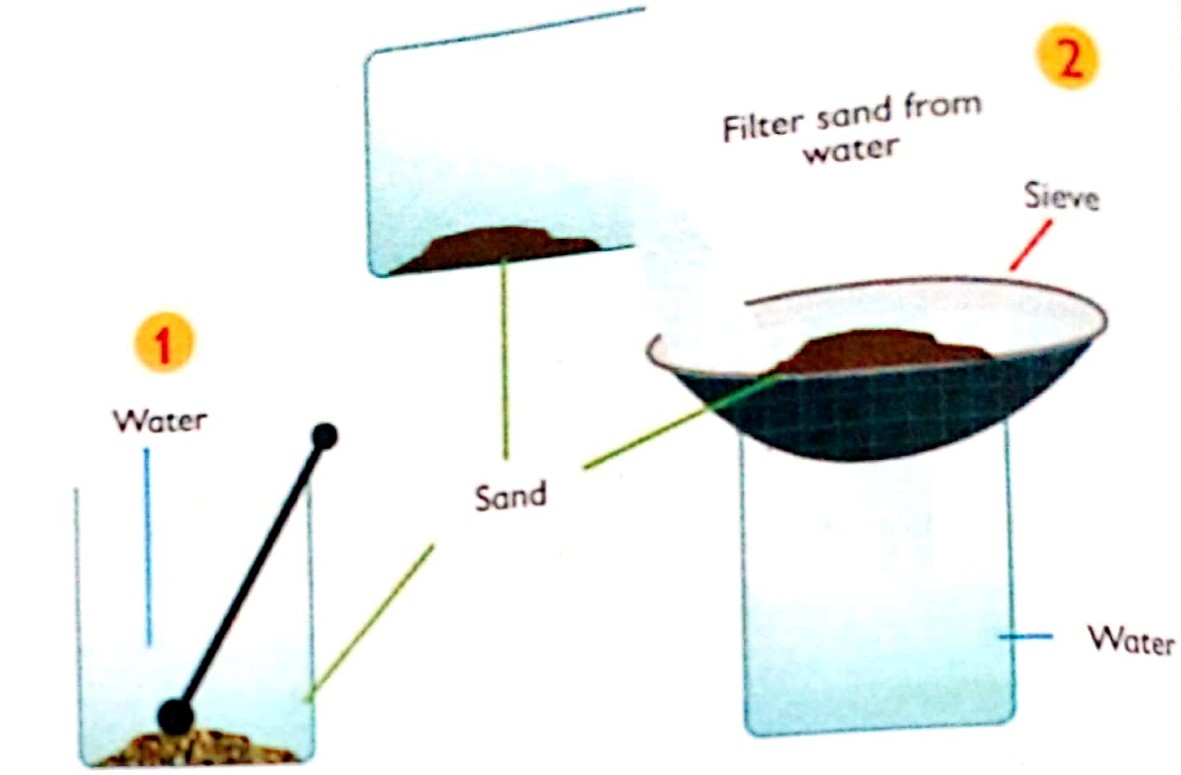
Activity 1.8: Separating a mixture by sieving method

What is needed: water, small stones, tea leaves, cup, beaker, and a sieve.

What to do

1. Work in groups.
2. Mix the small stones and water thoroughly in a large beaker or put tea leaves in hot water.
3. Observe and record what you see? Does the small stones settle at the bottom of the beaker?
4. Put a sieve over the mouth of a beaker or cup.
5. Pour the mixture on the sieve which should be held tightly over the mouth of the beaker or cup.
6. Allow the water to drain completely from the small stones or tea leaves which are trapped in the sieve.

   What is collected in the sieve? What is collected in the cup or beaker?



PROJECT: Separation of solid-liquid mixtures such as sand and water

What to do

1. Work in groups.
2. Carry out activities to separate a solid-liquid mixture such as sand and water
3. Present your work to the whole class for discussion.

Liquid – Liquid Mixtures

This is the type of mixture in which the constituents are made up of two different liquids. Examples may include cooking oil and water, milk, vinegar and water, soft drink and water.

There are two groups of liquids. These are miscible liquids and immiscible liquids.

Miscible and immiscible liquids

Miscible liquids which can mix together completely to form a liquid-liquid mixture such that only one of the constituent is seen. Examples include water and alcohol, water and vinegar, petrol and kerosene.

Immiscible liquids are forming a liquid-liquid mixture which the constituents do not mix completely such that both constituents can be seen. Examples include, water and cooking oil, vinegar and oil, water and benzene.

Separation of Immiscible Liquids

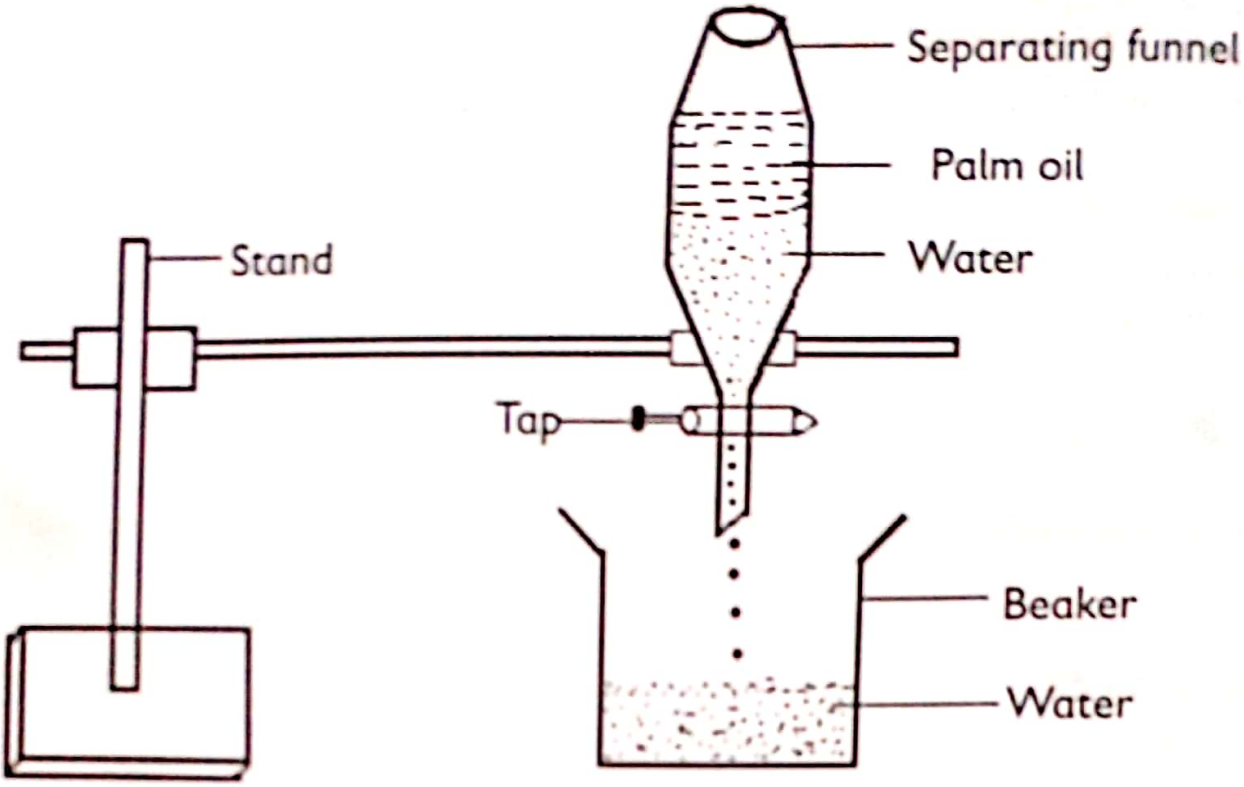
Immiscible liquids can be separated into the individual components using a separating funnel.

Activity 1.9: Separating immiscible liquids

What you need: a mixture of water and palm oil, separating funnel, stand, and beaker.

What to do

1. Work in groups.
2. Mix cooking oil and water.
3. Pour the mixture into the separating funnel and hold it in place with the stand.
4. Place a beaker under the tip of the separating funnel and allow the mixture to settle as the tap is closed.
5. Observe the mixture. Which liquid is at the top? Which liquid is at the bottom?
6. Open the tap gently for the water to drain into the beaker.
7. Watch carefully and close the tap immediately all the water is drained off.
8. Pour the palm oil into another container to get the liquids separated as illustrated below.



The reason the water settles at the base is that the water is denser than the palm oil.

Important Things To Remember

- A solid-liquid mixture is the type of mixture whose components are made up of solid and liquid substances.
- The methods for separating solid-liquid mixtures into the components include filtration, evaporation, decantation and sieving.
- A liquid-liquid mixture is mixture in which the constituents are made up of two different liquids.
- Liquids that mix completely are called **miscible liquids.**
- Liquids that cannot mix completely are called **Immiscible Liquids**

END OF LESSON EXERCISE

Answer the questions below

1. What is a solid-liquid mixture?
2. Give three examples of solid-liquid mixture.
3. Describe how you will separate sand-water mixture.
4. When a solid substance completely dissolves to form a mixture the mixture formed is called suspension. **True or False**
5. Kerosene and oil paint when mix together forms solid-liquid mixture. **True or False**
6. What is a liquid-liquid mixture?
7. Give two examples of liquid-liquid mixtures.
8. Filtration can be used to separate immiscible liquids. **True or False**
9. Kerosene and oil paint when mix together forms liquid-liquid mixture. **True or False**

NOTES

Strand 2

CYCLES

Sub-Strand 1 — Earth Science

Content Standard:

B5.2.1.1: Recognise that some events in our environment occur recurrently

Lesson 6: How day and night are formed

B5.2.1.2: Recognise the relationship between the Earth and the Sun

Lesson 7: 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

Lesson 8: Evaporation and condensation as important processes of the hydrological (water) cycle

Lesson 9: How clouds are formed

B5.2.1.4: Demonstrate understanding of how carbon and nitrogen are cycled in nature

Lesson 10: Uses of carbon dioxide and its effects on humans and life on earth

B4.2.1.5: Recognise water and air as important natural resources

Lesson 11: Human activities that make water unsuitable for human use

Lesson 12: Making and keeping air clean in our environment

LESSON 6:

HOW DAY AND NIGHT ARE FORMED

Learning indicator.

1. Know how day and night are formed.

WHAT BRINGS ABOUT DAY AND NIGHT

The earth moves on its own axis within a day. The complete movement of the earth on its own axis in a day is called **Rotation of the Earth.**

How the Earth Rotate in a Day

The rotation of the earth on its own axis causes **day and night.** From morning to evening make the day time and from evening to morning also make the night time.

The sun shines during the day. We can see everything around us at day time. The sun sets at the evening and night begins. At night, we sometimes see stars and the moon appearing in the sky. The moon appears to give light at night. When the earth continues to rotate and our portion of the earth begins to face the sun again, then we begin a new day. The earth takes 24 hours to make a full turn or rotation. This is the reason we have 24 hours in a full day. A full day comprises **day and night.**

Day Time

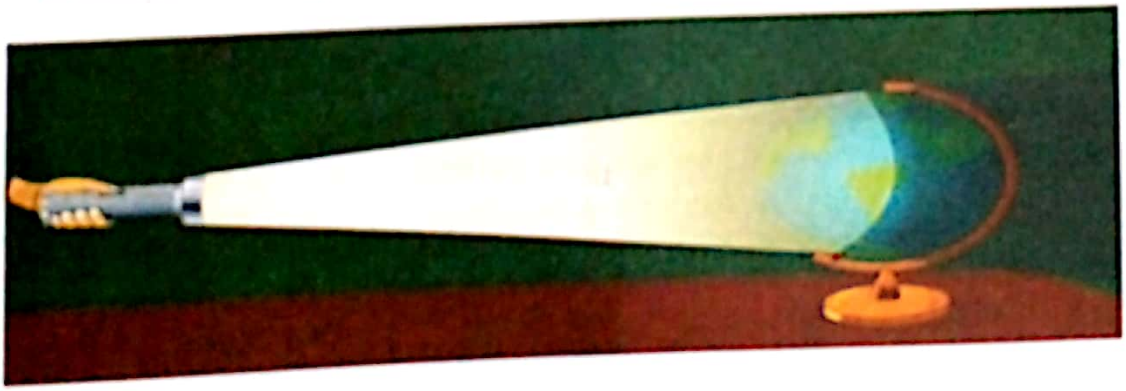
Night Time

Activity 2.0: Demonstrating day and night

What you need: a torchlight, a globe, a marker or sticker, a table and a bit dark room.

What to do:

1. Work in groups.
2. Get a room which is a bit dark, a torchlight to represent the sunlight from a fixed Sun and the globe to represent the Earth.
3. Fix the torchlight on a fixed stand on a table and place the globe on a table to face the torchlight at a distance.



4. Switch on the torchlight (flashlight). Which side of the globe is bright and which side is dark?
5. Make a mark or place a small sticker at the central part of the globe facing the light from the flashlight.
6. Rotate or turn the globe slowly about an axis in an anticlockwise manner.

7. Observe the movement of the sticker or the mark on the globe.
8. Is the mark always in the light from the flashlight? Tell what happens.
9. Which part of the globe is bright? What does the bright part represent?
10. Which part of the globe is dark? What does the dark part represent?
11. Continue turning the globe round about the axis until it gets to the starting point.
12. Does the same part of the globe face the flashlight always?
13. Can you now tell how day and night occur?
14. Draw diagrams to represent the formation of day and night.

From the activity, the torchlight represents the Sun which is fixed.
The globe represents the Earth.
Only half portion of the earth faces the sun at a time.
The portion that faces the Sun gets a lot of sunlight.
The sunlight causes day time on the Earth as illustrated by the bright spot on the globe. There is no darkness and we can see everything with our eyes because of the sunlight.

Darkness forms on the other half portion of the Earth as represented by the "dark" portion on the globe. This portion does not receive sunlight.

People or countries who find themselves in the dark portion experiences night time.

As the rotation of the earth continues, the dark portion will experience day time and the day time portion will also turn to experience night time. This is the reason why we experience day and night at different times.

Important Things To Remember

- The rotation of the earth on its own axis causes **day and night.**
- The earth takes 24 hours to make a full turn or rotation.
- The Sun is fixed but the Earth rotates about its axis.
- The portion of the Earth facing the Sun experiences day time.
- The portion of the Earth facing the Sun experiences night time.

END OF LESSON EXERCISE

Exercise A

Answer the questions below

1) The movement of the Earth on its axis is known as _____ (Rotation, Revolution)]

2) The Sun does not move in causing day and night _____(True/ false)

3) Rotation of the Earth causes _____and _____

4) During the day the full portion of the Earth faces the Sun _____ (True/ False)

Exercise B

Answer the questions below

1) The Earth uses 24 hours to complete one rotation _____ (True/ False)

2) There are _____ hours in a full day (24,12,48)

3) The part of the Earth that faces the Sun has _____ (sunlight, darkness)

4) The Earth get sunlight during the night _____ (True/ False)

Exercise C

Answer the questions below

1) The Sun does not shine at night _____ (True/ False)

2) The portion of the Earth that does not face the Sun experiences _____ (sunlight, Darkness)

LESSON 7:

BENEFITS OF THE SUN TO THE EARTH

Learning indicator.

1. Describe the benefits of the Sun to the Earth.

Introduction

The Sun is very important to all living things and to the Earth.
The Sun is a ball of fire far up in the sky.

The Sun has energy in it. In this lesson, we shall learn about the benefits of the Sun to the Earth.

The Sun appears as a ball of fire in the sky. We see the Sun during the day time.

Sun appearing from the sky

The basic source of energy for all living things on earth is the Sun. We shall learn about the uses of the Sun in this lesson.

The Importance of Sun

The Sun is the major source of energy on Earth. Some of the importance or uses of Sun are:

1. The Sun is a major source of light for the Earth.

The light from the Sun helps us to see. We can see clearly during the day without any artificial light. The light that comes from the Sun helps us to see at day time. This light from the Sun is called **Sunlight.** It becomes very difficult to see at night where there is no sunlight. Animals and human beings move around and perform their activities because they can see. Everything becomes clear and visible in the environment during the day.

Community with enough sunlight for both human beings and animals

2. The Sun is a source of warmth for the Earth.

i. **The warmth of the Sun helps us to dry our washed clothes.**

The clothes that our mothers and sisters wash and hang on the drying line dry faster on sunny days. On less sunny days, washed clothes do not dry faster. You can notice this by washing handkerchiefs of the same size and made with the same materials. Dry one in the room and the other on the sun. You will notice that, the one dried in the sun dries faster than the one in the room.

Clothes on a drying line

ii. The warmth of the Sun helps farmers to dry their crops.
Farmers use the warmth of the Sun to dry crops such as; cocoa beans, coffee, maize, beans, rice, wheat and okro. Without the warmth of the Sun, all the crops will rot.

Drying cocoa beans

Drying maize

iii. Fishermen and fish sellers use the warmth of the Sun to dry their fish. Salted fish are always dried in the sun to keep them from going bad. The warmth of the Sun is also used to dry other types of fishes to keep them from spoiling.

Drying of fish in the sun

iv. The warmth of the Sun helps to keep things warm on Earth. Animals and human beings need the warmth of the Sun to keep them warm. The warmth of the Sun then makes animals and human beings active.

v. The warmth of the Sun provides us with vitamin D. Early morning warmth of the Sun gives vitamin D to the body. It is advisable to expose ourselves to early morning sunrise. The ability of the Sun to keep us warm and as a source of vitamin D helps to give us energy.

Activity 2.1: To Show That Sunlight Keep Things Warm

What You Need: two metallic plates of the same size.

What to do:

1. Put one of the plates under the midday Sun.
2. Place the second plate in the room at the same time.
3. After thirty minutes (30 minutes) get the two plates and feel the temperature of each of them.

Observation:

You will observe that the plate under the sun feels warmer than the plate in the room. This shows that the sunlight keeps things warm.

3. The Sun as a source of energy for plant growth

Plants prepare their own food to get energy to grow. Plants can only prepare their own food with the help of light from the Sun. The sunlight is the basic source of light energy to all living things. Without the sunlight plants cannot prepare their own food.

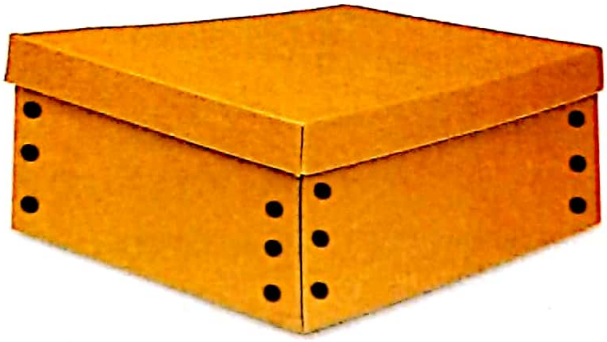
Sun shining on crops or plants

PROJECT: Importance of the Sun to plant growth

What you need: Two potted plant, a box.

What to do:

1. Name the potted plants **A** and **B**.
2. Put potted plants **A** into a box and close it. Make sure light does not enter the box but air can enter into the box.
3. Put the potted plant **B** in a place where it will get enough sunlight.
4. Leave the set up for five days.
5. Observe the plants after five days and present a report.



A box with potted plant **A**

Potted plant **B**

Important Things To Remember

- The Sun is a major source of light.
- The light from the Sun helps us to see.
- The Sun is a source of warmth for the Earth.
- The warmth from the Sun is used to dry crops and clothes.
- The Sun is a source of energy for plant growth.

END OF LESSON EXERCISE

Exercise A

Answer the questions below

1) The basic source of energy for living things is _____(battery, Sun)

2) The light that comes from the sun is _____ (sunlight, sunrise)

3) One uses of the Sun is for _____ (smoking fish, drying crops)

4) _____ helps us to see during the day (Sun, torch)

5) Plants need sunlight to _____ (Grow, Die).

Exercise B

Answer the questions below

1) The Sun provides energy to living things _____ True/ False

2) Plants do not prepare their own food. _____ True/ False

3) Plants that do not get enough sunlight grow weaker _ True/ False

4) We get warmth from the Sun. _____. True/False

Exercise C

Answer the questions below

1) Three uses or importance of Sun are:

   i. .....

   ii. .....

   iii. .....

2) The light we get from the Sun is known as _____

3) Early morning Sun helps us to get which type of vitamin?

Exercise D

Answer the questions below

1) Name two crops farmers use the Sun to dry

   a. _____

   b. _____

2) If you put cold water in the sun it will become _____ (warm, cold)

3) Fishermen dry their _____ in the Sun during the day (boats, fishes)

4) Wet clothes in the Sun dry faster than those in the room. True/ False

5) Plants need _____ to make their food. (sunlight, rain)

LESSON 8:

EVAPORATION AND CONDENSATION AS IMPORTANT PROCESSES OF THE HYDROLOGICAL (WATER) CYCLE

Learning indicator.

1. Demonstrate evaporation and combination as important processes of the hydrological (water) cycle

Introduction

Water cycle is the circulation of water in nature by which water from the atmosphere comes to the Earth.

The movement of things from one stage to another by going round in a circular form is termed as a **cycle**. **Water cycle** is a cycle whereby water goes round by changing from one state to the other and back to its original liquid state.

The terms associated with water cycle are evaporation, condensation, transpiration and precipitation. In this lesson we shall focus on evaporation and condensation.

1. Evaporation

Evaporation is the process whereby water changes into water vapour. When we put our washed clothes on the drying line and leave them for some time they dry up. Water vapour rises from boiling water and dries up. Sometimes the whole water in the container move from its original state into the atmosphere in the form of vapour showing that evaporation has occurred.

Activity 2.2: Demonstration of evaporation

Materials needed: Source of heat, metal bowl, water and tripod stand.

Procedure:

1. Wash your hands in water.
2. Allow your wet hands to stay for about thirty minutes.
3. Observe your hands after thirty minutes.
4. What happens to the water on your hands?
5. Half fill the metallic bowl with water and put it on the tripod stand.
6. Introduce the source of heat and leave the set up for some time as shown below.

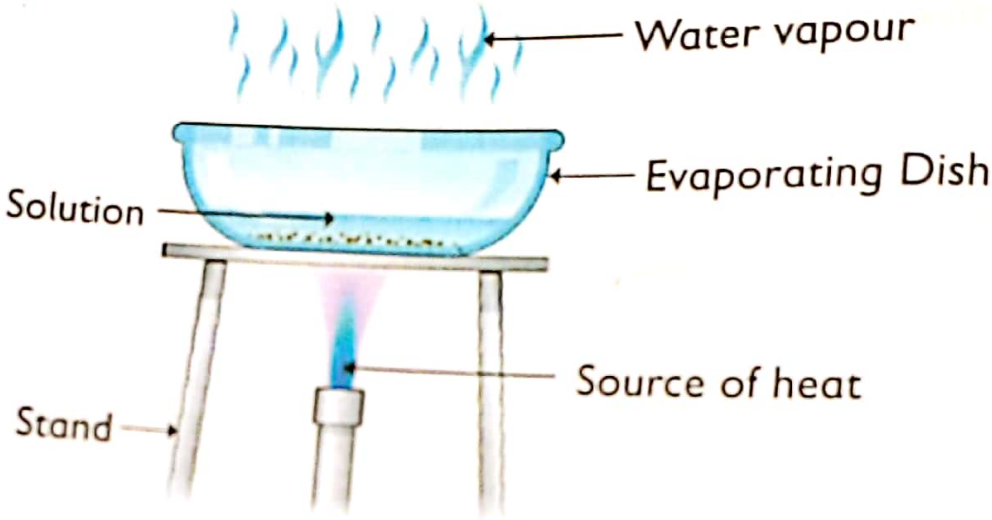


Diagram of evaporation

Observation:

The wet hands dry up as a result of evaporation. The body heat will warm the water and it will change to wapour.

Also after water has been heated with a source of heat for some time, the water begins to boil. Water vapour is seen escaping from the bowl into the atmosphere showing the occurrence of evaporation.

2. Condensation

Condensation is the process whereby water vapour changes into water after cooling. Since vapour or steam is a hot air with water whenever the vapour gets into a cool environment it cools and changes to its original water form. We can therefore say that condensation is the opposite of evaporation.

Activity 2.3: Demonstration of Condensation

Materials needed: water, bowl, transparent lid

Procedure:

1. Half fill the bowl with water and put it on the tripod stand.
2. Introduce the source of heat and leave the set up for some time until the water boils.
3. Place a cold transparent glass plate in a slanted way at the top to block the vapour as shown in the diagram below.
4. Observe the droplets of water collected on the glass cover.

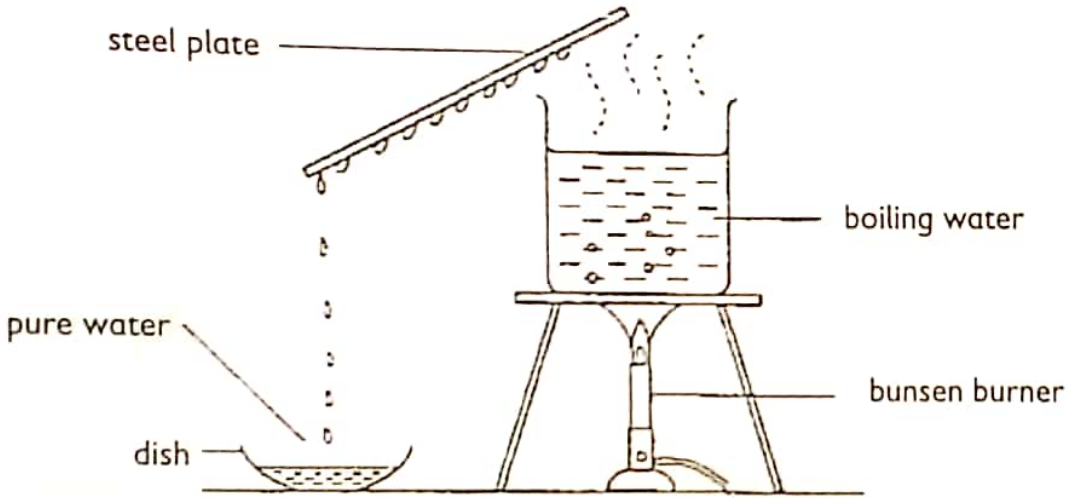


Diagram of condensation

Observation:

Droplet of water is observed under the transparent lid or steel plate. This shows that the vapour from the boiling water has turned into small droplet of water. This means that condensation has taken place.

Evaporation and condensation as part of the water cycle

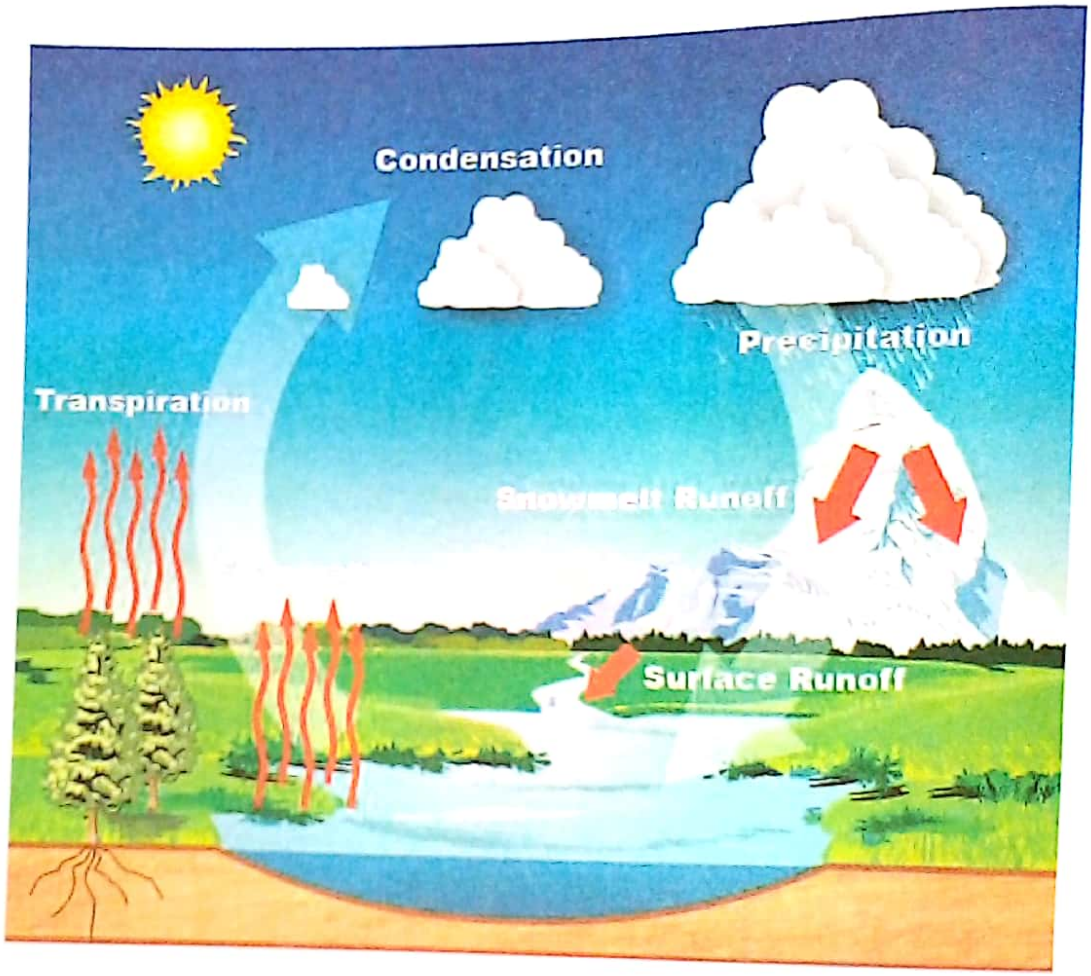
Water cycle is the process whereby water on the surface of the earth, sea, water bodies and plant go into the atmosphere through **evaporation** and other processes and comes down through rainfall and others. When the Sun shines

water on the surface of the earth, sea, water bodies and plant turn into water vapour and go into the atmosphere through evaporation and transpiration.

The water vapour then moves into higher altitude and condenses further to form clouds. The clouds **condense** further into droplets of water and fall as rain or through precipitation.

Condensation of vapour leads to formation of clouds and subsequent rainfall.

Hence evaporation and condensation play important role in the water cycle which is illustrated below.



Water cycle

Important Things To Remember

- Evaporation is the process whereby water changes into water vapour.
- Condensation is the process whereby water vapour changes into water after cooling.

- Evaporation and condensation play important role in the water cycle.

END OF LESSON EXERCISE

Exercise A

Answer the questions below

1) What is evaporation?
2) What is condensation?
3) Define the term water cycle.

Exercise B

Answer the questions below

1) _____ is the turning of water vapour into drops of water.
2) _____is the turning of water into vapour.
3) All the following are parts of water cycle except
   a. Boiling b. Evaporation c. transpiration d. condensation
4) Which of the following is not a condition that increases evaporation?
   a. Heating b. dry wind c. Low dew d. Strong wind
5) Water cycle is a natural occurrence. True/False

LESSON 9:

HOW CLOUDS ARE FORMED

Learning indicator.

1. Know how clouds are formed.

Introduction

Clouds are found in the sky all the time. You may wonder what they are and how they are formed. In this lesson, we shall learn about what clouds are and how they are formed.

Composition of Air

Air is made up of different gases at different ratio or percentage. The composition includes the following:

Gas	Content
Nitrogen	78%
Oxygen	21.0%
Carbon dioxide	0.03%
Rare gases	1.0%
Water Vapour	Variable
Dust Particles	Variable

The main components of air are nitrogen and oxygen. It is clear from the table that air is a mixture of gases. Water vapour and dust particles have variable content in air due to humidity. During the rainy season or humid periods the level of water vapour in air is high. During the sunny or dry season dust particles increase in the air. Since the dust particles become dry and lighter in weight they become suspend in air.

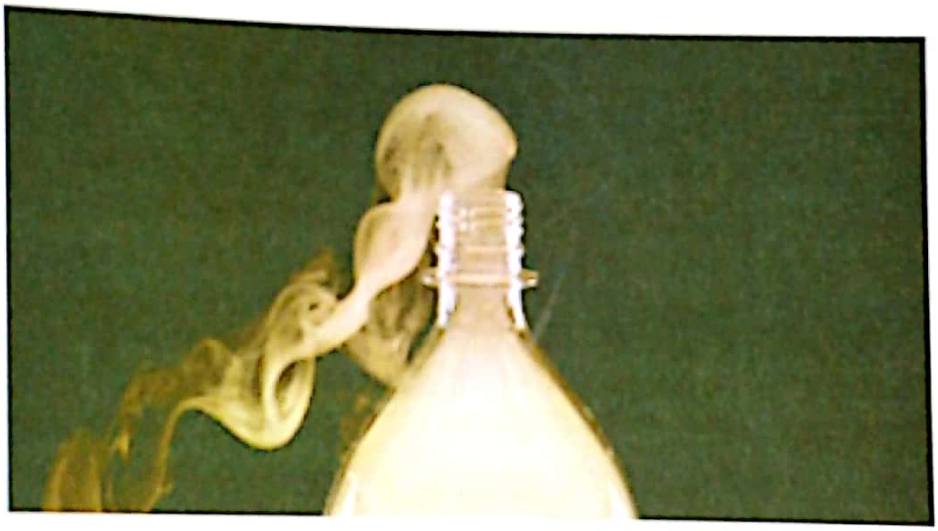
FORMATION OF CLOUDS

A cloud is a mass of water drops or ice crystals suspended in the atmosphere. The droplets are so small and light that they can float in the air. Clouds form when water vapour condenses in the sky. All air contains water, but near the ground it is usually in the form of an invisible gas called **water vapour.**

When warm air rises, it expands and cools. Cool air cannot hold as much water vapour as warm air, so some of the vapour condenses onto tiny pieces of dust that are floating in the air and forms a tiny droplet around each dust particle. When billions of these droplets come together they become a visible cloud.

Activity 2.4: Formation of clouds in a bottle

Materials needed: An empty plastic (Voltic) bottle. A rubber stopper (with a hole through the centre) that fits the mouth of the bottle tightly, bicycle pump, cellotape or a seal and alcohol



Cloud coming out of a bottle in the form of smoke.

How to go about it

1) Pour some alcohol into the bottle to cover the bottom, about one-tenth of the entire volume.
2) Place the stopper tightly into the mouth of the plastic bottle.
3) Place the end of hose of the pump over the hole in the stopper as tightly as Possible.

4) Pump air into the bottle.
5) After a few strokes on the pump handle, quickly and simultaneously remove the stopper and the air hose from the bottle.
6) Observe what you see in the bottle.

A cloud would be seen in the bottle immediately the pump is removed from the bottle. The pumping compresses the air and its hotness increases and picks up moisture in the air. As soon as the pump is removed, the gas expands and cools immediately. The moisture held by the gas is released and a cloud is formed.

Important Things To Remember

- A cloud is a mass of water drops or ice crystals suspended in the atmosphere
- When water vapour **condenses** to form tiny water droplets or ice crystals in the air and a cloud is said to have formed.

END OF LESSON EXERCISE

Answer the questions below

1) What are clouds?
2) Describe the formation of clouds.
3) Water vapour is the major component of air. **True /false**
4) _____ is a mixture of gases.
5) Oxygen forms _____ of the total air
6) Carbon-dioxide component of air is 3%. **True /false**

LESSON 10:

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

Learning indicator.

1. Describe the uses of carbon dioxide and its effects on humans and life on earth.

WHAT IS CARBON DIOXIDE?

In the previous lesson, we learnt that carbon dioxide gas represents 0.03 % of the volume of the air around us.

Carbon dioxide is a colourless and odourlesss gas. Carbon dioxide is present everywhere. All animals breathe out carbon dioxide and breathe in oxygen. The carbon dioxide in the atmosphere is used in many ways.

In this lesson the focus is the uses of carbon dioxide.

USES OF CARBON DIOXIDE

Some of the uses are as follows:

1. **Preparation of plant food.** Carbon dioxide gas is necessary for the process of preparation of food by plants. The plants use the food they prepare for their growth.
2. **Respiration.** Animals breathe in oxygen. Oxygen is the by-product in the process of the preparation of plant food. Thus plants indirectly supply oxygen for respiration in animals
3. **Preparation of fizzy drinks.** Carbon dioxide gas is used in making soft drinks, such as coca-cola, fanta, sprite, malt etc.
4. **Fire extinguisher.** Carbon dioxide gas does not support burning. It is therefore used in extinguishing fires or putting off fires.
5. **Production of cooling systems.** Carbon dioxide gas is used in making the dry ice which is used in refrigeration through pressure and cooling processes.

6. **Chemical and Pharmaceutical Applications.** Carbon dioxide gas is used to make urea (used as a fertilizer).

HOW CARBON DIOXIDE GETS INTO THE ENVIRONMENT

Carbon dioxide enters the atmosphere in a number of ways. Some of them are as follows:

1. Burning of petroleum products and vegetation.

Carbon dioxide gas is released into the environment due to the human activities such as the burning of oil, coal and natural gas, burning of fossil fuels and burning of forests. The largest human source of carbon dioxide emissions is from the combustion of fossil fuels.

Smoke from car exhaust pipes

Dust from mining sites.

2. Volcanic eruptions.

During volcanic eruptions, a lot of carbon dioxide is released into the atmosphere together with magma, ash, dust and other gases from deep below the Earth's surface.

Volcanic eruption

3. Industrial processes.

Some industrial processes such as the production and consumption of cement, the production of metals such as iron and steel, as well as the production of chemicals and petrochemical products produce carbon dioxide gas.

Smoke from Industries

HEALTH EFFECTS OF CARBON DIOXIDE

As a result of human activities such as burning of fuel and vegetation, there is high level of carbon dioxide in the air we breathe. The excess carbon dioxide displaces oxygen and creates breathing problems. Excess carbon dioxide which enters the human body has health challenges such as headaches, suffocation, unconsciousness and seizures.

ADVERSE EFFECTS OF CARBON DIOXIDE ON THE ENVIRONMENT

Some gases serve as heat traps or greenhouse effect in the atmosphere. They are called greenhouse gases. Carbon dioxide is a major components of **greenhouse gases**. The large volume of carbon dioxide into the atmosphere by excessive burning of fossil fuel and vegetation results in the greenhouse effect which keeps our planet warm. The increasing warming of the earth is called **global warming**.

Global warming is having an effect on the **world's climates.** The weather includes the wind, sunshine and rain you see from day to day. The climate is the kind of weather seen over years and decades. Climate change and its effects as a result of global warming includes:

- Ice melting faster than it can be replaced in the northern pole and southern pole of the earth.
- The oceans warming up. The ocean water is expanding and causing sea levels to rise. A lot of our coastlands are being destroyed because of the rise in sea levels.
- Changes in rainfall patterns. As a result of global warming, some places on earth are experiencing more rain than they normally experience and this causes a lot of flooding. Some places are also experiencing very little rainfall leading to draught in such places.

Important Things To Remember

- Carbon dioxide gas represents 0.03 % of the volume of the air around us.
- All humans and animals exhale carbon dioxide when they breathe.
- Plants absorb carbon dioxide during the process where they prepare their food in order to grow.
- Carbon dioxide emissions has adverse health effect on humans since it displaces oxygen and this creates breathing problems.
- Carbon dioxide has many uses.
- Carbon dioxide gets into the environment as a result of volcanic eruptions, burning of fossil fuels and forests, and industrial processes.

END OF LESSON EXERCISE

Answer the questions below

1) List three uses of carbon dioxide.
2) List two effects of carbon dioxide on human health.
3) What is the percentage of carbon dioxide in air?
4) How does carbon dioxide affect the climate?

5) Plants use carbon dioxide during the process of preparation of plant food. **True or False**

6) Carbon dioxide can support burning. **True or False**

7) Plants use carbon dioxide during the process of preparation of plant food. **True or False**

Lesson 11:

HUMAN ACTIVITIES THAT MAKE WATER UNSUITABLE FOR HUMAN USE

Learning indicator.

1. Identify human activities that make water unsuitable for human use.

Introduction

Water is one of the most important resources that support plants and animals life on earth. Without water all living things (plants and animals) will die. As human beings, we use water to drink, wash our clothes and utensils, cook, bath etc. This means water is very important in our life

Drinking water

Cooking

Washing

Sometimes the water becomes bad and unsuitable for human use. When we cannot use water to do the things water is needed for, then we say the water is unsafe to use. Unsafe water contains germs and sometimes has bad scent. In this lesson, we shall identify the human activities that make water unsuitable for human use.

Activity 2.5: Finding out ways water is made unsuitable for use

What you need: cut-out pictures showing how water is polluted.

What to do

1. Work in groups.
2. Discuss qualities of good drinking water.

3. Identify human activities that make water unsuitable for use such as sewage leakages, flooding during rainy season which carries waste deposits into water bodies, industrial waste dumped into water, mining, littering, pesticides application, fertilizer application, household chemicals and improper disposal of animal wastes.

4. Brainstorm to come out with ways of preventing, minimizing and controlling water pollution.

PROJECT:

Concept map on causes, control and prevention of water pollution

How to go about it

1. Work in groups.
2. Design a concept map on the causes, control and prevention of water pollution.
3. Present your work to class for discussion.

Water Pollution

Water pollution is making the water unsafe for use by human plants and animals. Any water that becomes difficult to use because it contains dirt and germs is polluted water.

Causes of Water Pollution

Some of the ways we pollute our water sources or water bodies are:

i. Dumping sewage into water bodies.
ii. Connecting sewage into water sources
iii. Washing in water bodies
iv. Swimming in water bodies
v. Chemicals for fishing
vi. Oil spillage.

Dumping of Waste

This is where people throw rubbish into water bodies. The rubbish is a waste which carries germs and dirt particles. These germs and dirt particles are harmful to human. Waste dumped into our water bodies pollute the water and make the water unsafe for drinking and use.

Sewage

This is liquid waste from households and industries that is carried through pipes and gutters. When the pipes and the gutters are connected into water sources, the wastes pollute the water. The water becomes unsafe to use or polluted. Sewage is a combination of urine, faeces and waste water of all types carried through pipes and gutters.

Sewers or sewage pipes connected into water bodies

Washing

In some villages in Ghana, most people wash their dirty clothes in lakes, rivers streams and ponds. The soap and dirt make the water dirty and unsafe to use. The water then becomes polluted. The dirt and soap flow downstream for others to fetch. This practice is bad and must be avoided.

Washing of clothes

Swimming

Some people also swim and bath in our water bodies. The dirt and the bacteria on their bodies are washed into the water. They sometimes urinate, defecate and spit into the water. All these things pollute the water sources and make them unsafe to use.

Swimming in water bodies

Fishing with Chemicals

Some fishermen use chemicals to fish. The chemicals pollute the water and kill every animal living in the water. This practice is very bad and dangerous. The water becomes very poisonous to human beings and animals to drink. People and fishermen who practice this system of fishing should stop. Fishing with chemicals destroy the water source. Fishes collected from the polluted water are not wholesome for consumption.

Dead fishses due to water pollution

Oil spillage

Large vessels of ships are used to carry large volumes of oil from one country to another through the sea. Some of these ships develop faults or get accident and spill the oil into the sea, pollute the water and kill many animals in the sea.

Oil spillage in the sea

Animals Drinking In Water Bodies

Some herdsmen carry their large flocks or herd to the river source or water sources for them to drink. These animals step or walk in the water as they drink. They also defecate into the water as they drink. These pollute the water source and make it unsafe for drinking.

Animals drinking in the rivers

Ways of Preventing, Minimizing And Controlling Water Pollution

Water pollution can be minimized, prevented and controlled in many ways. Some of them are as follows:

1. **Avoid direct dumping of waste into water bodies.** We should desist from disposing rubbish or any other waste products into water bodies.
2. **Keep out oils, fat, or grease from the sink.** Cooking oil, fat and grease should not be poured down the kitchen sink. Instead, keep a jar that collects all the fats, grease or oil and discard in solid waste.
3. **Abstain from flushing pills, drugs, or medications down the drain.** These substances are toxic materials that destroy the quality of natural water.
4. **Ensure minimal use of bleach and detergents.** It is important to minimize the use of bleach and detergents in washing clothes and cleaning utensils.
5. **Reduce the use of herbicides, pesticides, and fertilizers.** Excessive use of herbicides, pesticides, and fertilizers leads to water pollution since they find their way into water bodies as runoff when it rains.
6. **Avoid the use of plastics.** Plastic leftovers such as used plastic water bottles, disposable plastic plates, and plastic bags frequently end up in water bodies, contaminating natural habitats and killing animals in water bodies.
7. **Practice planting trees, vegetation covers, grass, shrubs and flowers.** Planting trees, vegetation covers, grass, shrubs and flowers reduces the speed of surface runoff and prevents chemicals from washing into water bodies.

Important Things To Remember

- Water pollution is making the water unsafe for use by humans plants and animals.
- Some of the ways we pollute our water sources or water bodies are: dumping sewage into water bodies, connecting sewage into water sources, washing in water bodies, swimming in water bodies, chemicals for fishing and oil spillage.

END OF LESSON EXERCISE

Exercise A

Answer the questions below

1) An unsafe water is also called _____
   a. Polluted water
   b. Undrinkable water
   c. Treated water

2) _____ is not one of the uses of water
   a. Drinking
   b. Sewage
   c. Washing

3) Which of the following causes water pollution?
   a. Boiling water
   b. Dumping refuse into water
   c. Filtering water

4) Which of the following is not a way of polluting the water?
   a. Washing into water source
   b. Chemicals for fishing
   c. Planting trees around the water bodies.

Exercise B

Answer the questions below

1) Mention any three ways of polluting our water sources.
2) Discuss any three ways of protecting our water bodies.

Exercise C

Answer the questions below

1) Oil spillage kills fishes in the sea. _____ True/ False
2) Dumping waste into water bodies pollutes the water. True/False.
3) Fishing with chemical makes the water safe for drinking. True/False.
4) Swimming in rivers and streams can cause water pollution. True/False.
5) Which of the following can cause water pollution?
   a. Refuse
   b. Fishing with hook and line
   c. Fetching water
6) Which one of the following does not pollute the water?
   a. Dirt
   b. Germs
   c. Alum

Lesson 12:

MAKING AND KEEPING AIR CLEAN IN OUR ENVIRONMENT

Learning indicator.

1. Know how to make and keep air clean in our environment.

Introduction

The atmosphere is the air around us. The atmosphere is always getting polluted. The atmosphere is said to be polluted when harmful substances are released into the atmosphere to make it unclean. In basic 2, we learnt about how the environment, the atmosphere is polluted as a result of human activities. In this lesson, we shall learn about the causes, prevention, and control of air pollution.

CAUSES OF AIR POLLUTION

The atmosphere is the air around us.
The atmosphere is continuously being polluted by human activities
Some of the causes of air pollution are as follows:

1. **The burning of bush and wastes.** These activities send smoke carrying unwanted particles and gases into the atmosphere to pollute it. Most farmers in Ghana burn the bush after clearing the land for farming.

Activity 2.6: Investigating the activities that pollute the air in our environment

Materials needed: Pieces of paper, pictures of farmers burning cleared forest, and pictures or videos of burning bush, forest fires, and exhaust from cars in a busy street

How to go about it

1. Work in groups.
2. Discuss some activities, such as burning of bushes and rubbish that pollute the atmosphere.
3. Watch pictures or video clip on human activities that make the air unclean.

4. Discuss the effect of smoke from burning bushes, rubbish, tyres and petroleum products and dust from construction sites on the atmosphere.

5. Discuss to come out with the do's and don'ts that will make or keep air clean in the homes and surrounding environment, for example, planting of trees, prevention and control of air pollution.

CAUSES OF AIR POLLUTION

The atmosphere is the air around us. A lot of dangerous substances and gases are released daily into the atmosphere that pollute the atmosphere.

Human activities are responsible for the pollution of the atmosphere. Some of these activities are as follows:

1. **The burning of wastes and bush.** The burning of rubbish or wastes and bushes send smoke carrying unwanted particles and gases into the atmosphere.

Smoke from burning rubbish

Smoke from burning bush

2. **Exhaust of moving cars, trains and aeroplanes.** In the transportation industry, petroleum products such as petrol, diesel and gas are burnt to power the cars and trains and aeroplanes. In the process the exhaust from the burnt fuel send particles and gases into the atmosphere to pollute it.

Exhaust from cars in a busy street

3. **Manufacturing industries.** Factories such as smelting plants produce waste products and poisonous gases which leave the chimneys into the sky and pollute the atmosphere.

Smoke from Industries

4. **Mining.** Blasting of rocks in some mining areas and stone quarries send particles and poisonous gases into the atmosphere. Also the heavy equipment use fuel to power them. Exhausts from these machines send smoke of dangerous gases and particles into the atmosphere to pollute it.

Dust from mining

5. **Agriculture.** The use of agro chemicals to do aerial spraying of crops send gases into the atmosphere to pollute it

Aerial spraying of crops

6. **Smoking of cigarettes.** Smoke from cigarettes also send dangerous gases to pollute the atmosphere.

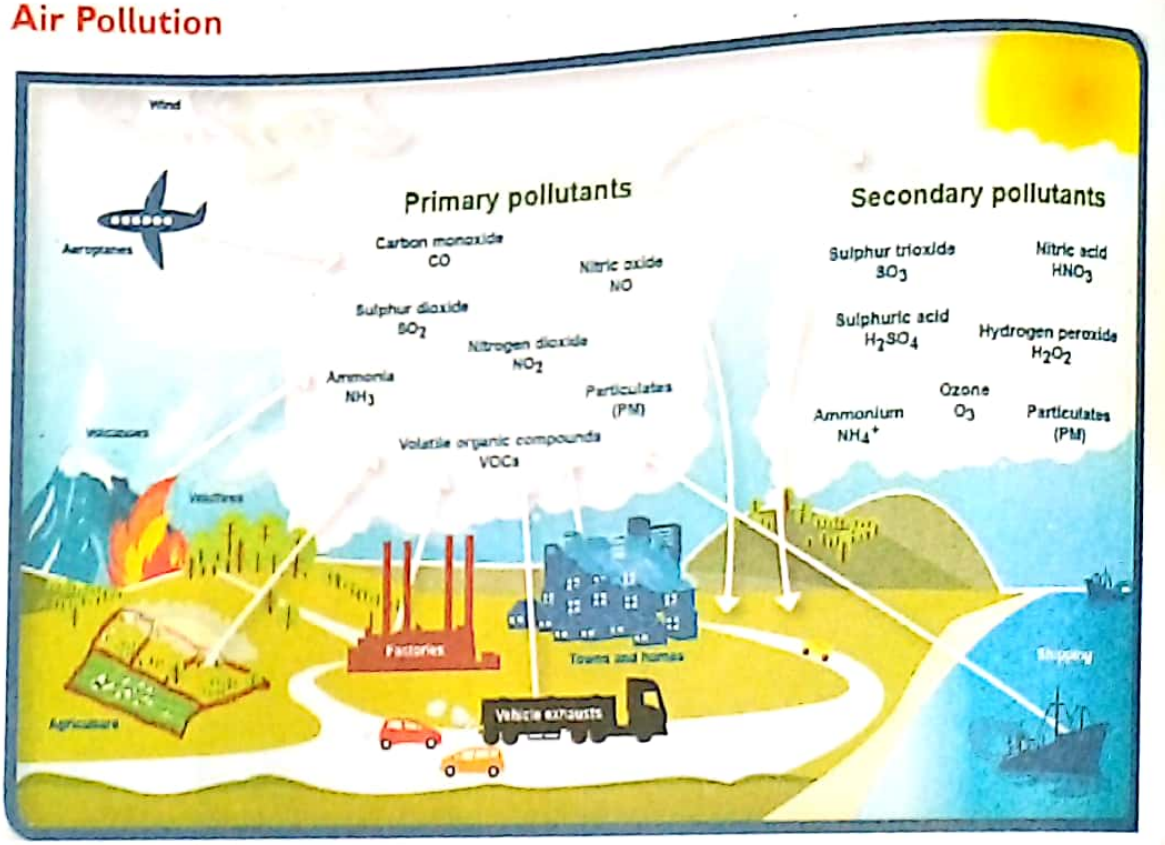
Smoke from a burning cigarette

PREVENTION AND CONTROL OF AIR POLLUTION

Prevention and control of air pollution are ways of keeping the air clean in our homes and surrounding environment. The ways of keeping the air clean include the following:

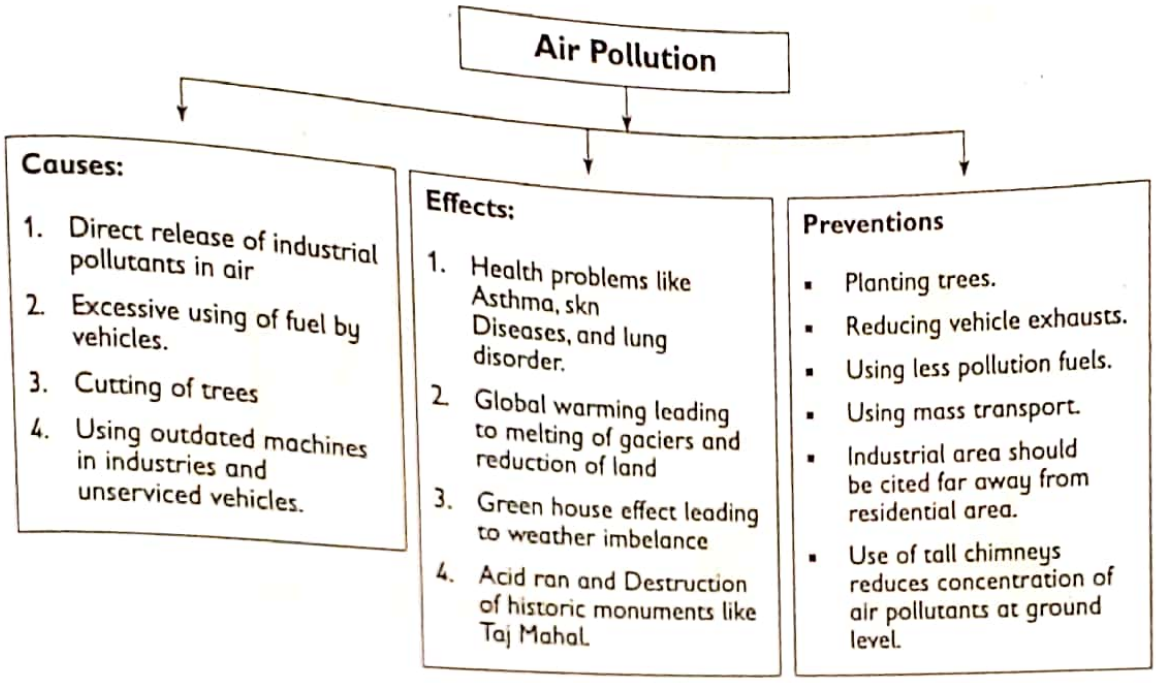
1. We should plant trees and grass in our surroundings.
2. We should avoid frequent and uncontrolled burning of vegetation and rubbish.
3. We should stop the use of aerosols sprays – deodorants, hair sprays, carpet cleaners, furniture polish and air refreshers.

Concept Map On The Causes, Prevention And Control Of Air Pollution



Sources of air pollutants

PROJECT 1: Designing a concept map and drawing Future's Wheel



What to do

1. Work in groups.
2. Design a concept map on the causes, prevention and control of air pollution.
3. Present your work to class.

EFFECTS OF AIR POLLUTION ON THE ENVIRONMENT

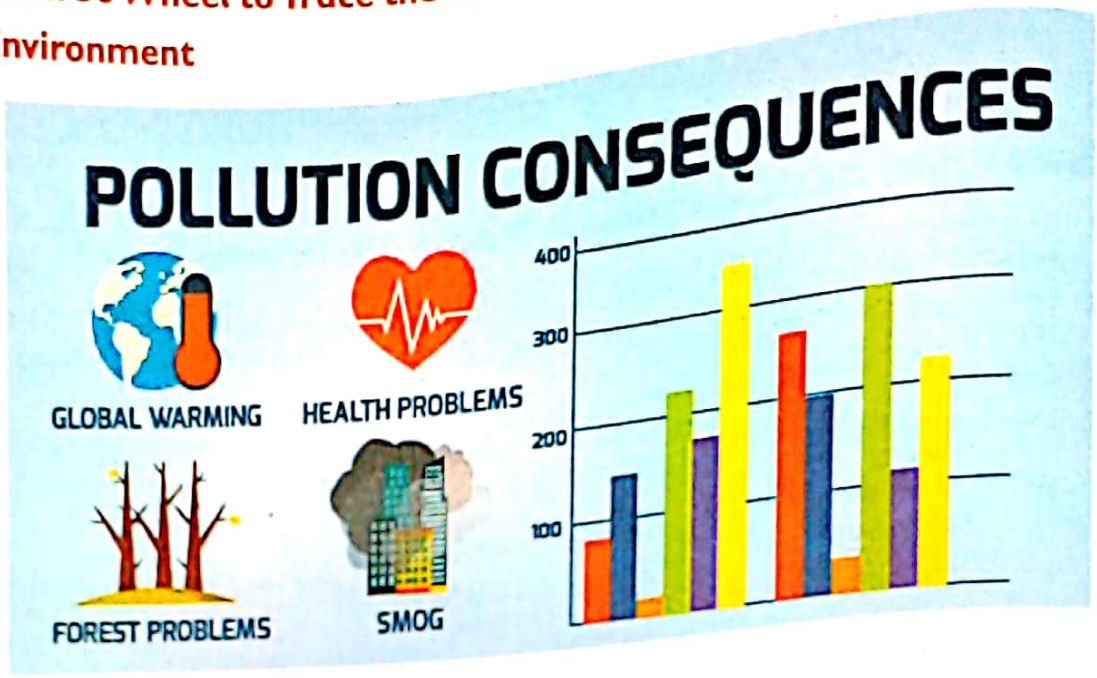
Pollution of air pollutants can affect directly or indirectly the human health.

Polluted air results in dark smoke hanging in the air and this affects breathing by both plants and animals.

Air pollution can cause acid rain. Acid rain has environmental effects on animals in water bodies, wildlife as well as crop and forest damages.

Air pollution causes the gradual warming of the earth called **Global warming** which results in climate change. Rainfall pattern is affected and this results in flooding and draught.

Future's Wheel to Trace the Effects of Air Pollution on the Environment



PROJECT 2: Designing a Future's Wheel

How to go about it

1. Work in groups.
2. Draw and use a Future's Wheel to trace the effects of air pollution on the environment.
3. Present your work to class for discussion.

Important Things To Know

- The atmosphere is the air around us.
- The atmosphere is polluted by human activities. Some of these activities are mining, construction, transportation, industrial work and agriculture.
- Air pollution can be prevented.

Important Things To Remember

- The atmosphere is the air around us.
- The atmosphere is polluted by human activities such as Burning of waste and bushes, exhaust from vehicles, mining, manufacturing industries and farming

END OF LESSON EXERCISE

Answer the questions below

1) What is the atmosphere?
2) What is air pollution?
3) Name three ways by which the air in our environment is made unclean.
4) List two ways of controlling air pollution
5) Gases and particles escape from the earth and do not affect atmosphere.

True or false

SUB-STRAND 2: LIFE CYCLE OF ORGANISMS

Content Standard:

B5.2.2.1: Demonstrate understanding of the life cycle of a plant

Lesson 13: The structure of the parts of a plant (leaves, stem, root, and flower) to the functions they perform

Lesson 14: Comparing the differences in germination of bean and maize seeds

LESSON 13:

THE STRUCTURE OF THE PARTS OF A PLANT (LEAVES, STEM, ROOT, AND FLOWER) TO THE FUNCTIONS THEY PERFORM

Learning indicator.

1. Know the structure of the parts of a plant and the functions the perform.

Introduction

A plant is a living thing that normally grows in the soil. Plants do not move from one place to the other. They only move in size and height and when the wind blows. Every plant has four main parts. These parts have specific functions. In this lesson, we shall learn about the functions of the parts of a plant.

Parts of a plant

The parts of a plant are the roots, stem, leaves and flowers.

Activity 2.8: Examining parts of a plant

What you need: Uprooted young plant, video on different plants.

What to do

1. Work in groups of four.
2. Go on a nature walk with your teacher and uproot young plants (herbaceous plants) and bring them to class.

3. Examine the plants and identify the parts of the plant (roots, stem, leaves and flowers).

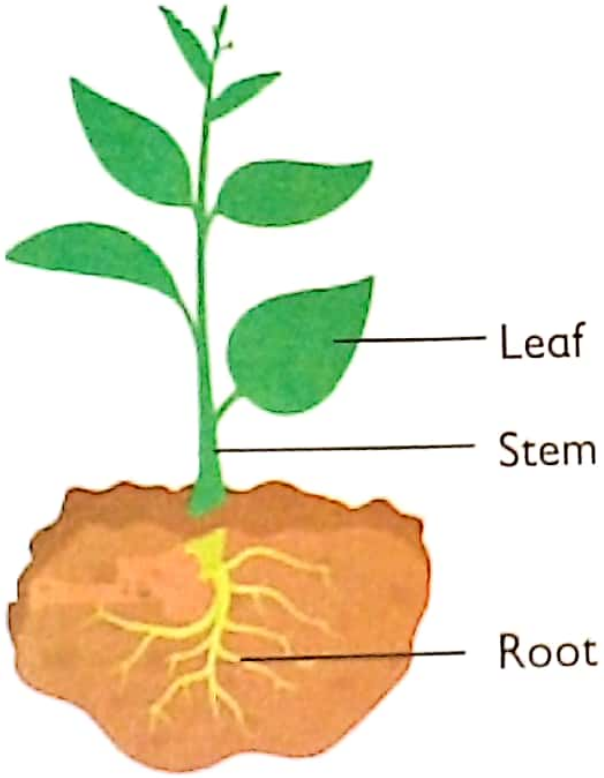
4. Tell the functions of the parts of a plant, for example, the thin and large surface area of the leaves and the presence of the green colouring matter in leaves, the function of the stem and roots.

5. Relate the functions of the parts to their positions on the plant.

6. Draw and colour a plant and label the parts.

7. Present your drawing to your teacher.

Let us look at the picture below to see parts of a plant.



Parts of a plant

Functions of the Parts of a Plant

1. The Roots

The root is the part of the plant which grows into the soil. The roots hold the plant firmly to prevent the plant from falling. Plant roots absorb water and minerals from the soil.

Functions of the Root

i. The roots absorb water and soil nutrients from the soil.
ii. The roots hold the plant firmly in place.
iii. Some roots store excess plant food in them. Examples are, cassava and potato.

2. The Stem

This is the part of the plant above the soil. The stem joins the root to other parts of the plant. The stem sends food and water to other parts of the plant. The plant stands upright by the help of the stem. The plant forms its branches from the stem. The stem holds the plant shoot in place. Though we have plants with creeping and climbing stems, the stem still provides the needed support.

Functions of the Stem

i. The stem helps the plant to stand up right.
ii. Water and plants nutrient move through the stem into the leaves.
iii. The stem carries the food made by the leaves to other parts of the plant.
iv. The stem supports the branches and leaves
v. Some plants store their food in the stem for example, sugarcane and pineapple plants.
vi. Some stems are used as planting materials, for example, cassava, and sugarcane and sweet potato plants.
vii. We use some plants stem to make furniture, for example, Odum, Mahogany and Wawa.

3. The Leaves

Leaves are the parts of the plant that prepare the plant's food. They are the most important part of the plant. Most plants leaves are green in colour. The chlorophyll in the leaves make the leaves green in colour. Some plants leaves are eaten as vegetables. The chlorophyll present in the leaves attracts the sunlight and combines it with water and mineral salt from the soil to make food for the plant.

Functions of Plant Leaves

i. The leaves make food for the plant.

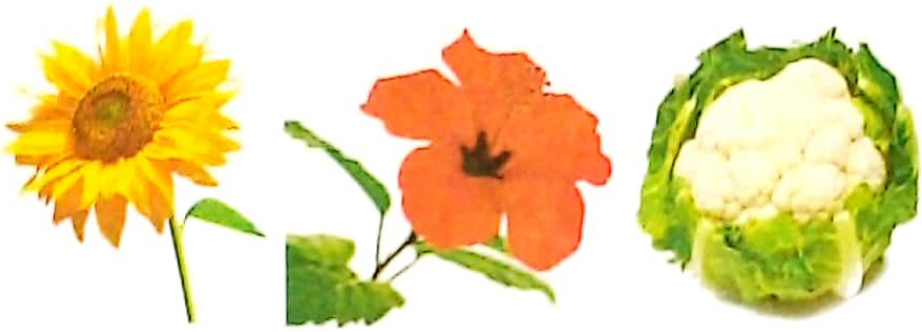
ii. Some leaves are used as vegetables, for examples, cabbage, cocoyam leaves, onion leaves and lettuce.

iii. Plants breathe through the leaves.

iv. The leaves release oxygen into the atmosphere.

4. The Flower

The flower is the reproductive part of the plant. Fruits and Seeds are made from the flower. Flowers are very beautiful and attractive. Flowers have pleasant smell. Some flowers are used as foods. Flowers grow from a bud. Some plants do not have flowers.



Sunflower Hibiscus Flower Cauliflower

Functions of the Flower

i. The flower produce fruits and seeds

ii. Some flowers are used as food, for example, Cauliflower.

iii. Bees produce honey from flowers

iv. Some flowers are planted to beautify our environment.

Important Things To Remember

- The parts of a plant are the roots, stem, leaves and flowers.
- Each part of a plant has specific functions.

END OF LESSON EXERCISE

Exercise A

Answer the questions below

1) Draw and label a plant.
2) What are the functions of the roots of a plant?
3) What are the functions of the stem of a plant?
4) What are the functions of the leaves of a plant?
5) What are the functions of the flowers of a plant

Exercise B

Answer the questions below

1) _____Is the part of the plant that prepares plant food (Root, leaves)
2) The part of the plant which can be used as vegetable is _____ (stem, leaves)
3) Plants breathe through their leaves. (True/False)
4) _____Is the part of the plant which grows into the soil? (Leaves, root).
5) _____ is the part of the plant above the soil. (stem, leaves)
6) _____holds the leaves and branches in place (root, stem)

Exercise C

Answer the questions below

1) _____Is the part of the plant that produces fruits and seeds (Roots, flowers)
2) The most beautiful part of the flower is the _____ (leaves, flowers)
3) _____ is the reproductive part of the plant. (Flower, Root)
4) The flower grow from the bud_____ (True/ False)

LESSON 14:

COMPARING THE DIFFERENCES IN GERMINATION OF BEAN AND MAIZE SEEDS

Learning indicator.

1. Compare the differences in germination of bean and maize seeds.

Introduction

Seeds are very important part of plants.
Plants are living things.
Living things can produce baby or young ones of their kind.
In some plants, baby or plants are obtained from seeds.

When seeds are sown, they grow into baby or young plants.
The process by which young or baby plants grow from seeds is called germination. In this lesson, we shall examine the stages of germination of a bean and a maize seed.

Stages of germination of seeds

Baby plants grow from seeds. Baby plants grow from seeds do so in stages.

Activity 2.9: Observing maize and bean seeds and how they germinate

Materials needed: Maize seeds, bean seeds and transparent polythene or glass jars containing cotton wool.

How to go about it

1. Work in groups.
2. Observe the dry bean seeds and dry maize seeds.
3. Pack two transparent glass or plastic containers with the cotton wool and push a dry bean seed through the side of a container and a maize seed through the side of the other container, but make sure that the seeds do not touch the bottom.

Germinating Beans Seed

Germinating Maize Seed

1. Pour a little water to soak the cotton wool.
2. Leave the two set-ups close to each other to stand for one week at a safe place while keeping the wool always wet.
3. Observe daily the seeds as they germinate.
4. Observe the various stages of germination in the following order: when the seeds absorb water to swell, the rupturing of the seed coats, the sprouting of the roots, the sprouting of the stems and seed leaves (cotyledons), and the elongation of the roots and stems.
5. Find out where the seed leaves (cotyledons) of each seed remain, whether inside or above the soil.
6. Draw each of the stages of germination of both the maize seed and the been seed.
7. Present your report to the whole class for discussion.

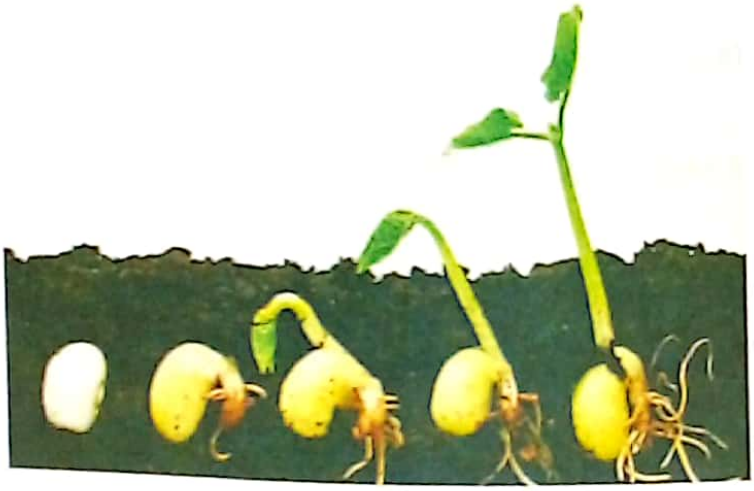
Stages of germination of a bean and maize seed

When a seed is planted in a wet soil it goes through the following processes:

- Swelling of seed coat when it absorbs water.
- Rapturing of the seed coat.
- Sprouting of the root.
- Spouting of the stem and seed leaves.
- Elongation of the root and stem.

Bean seed

During germination process of **bean seed,** primary root emerges through the seed coat when seed is buried in soil. The stem (hypocotyl) emerges from seed coat and grows upwards through the soil. As it grows up, it bends down and takes the shape of a hairpin. The stem comes out of the soil and continues growing straight upwards in the direction of light. The cotyledons (seed leaves) spread apart.



Stages of germination of bean seed (From seed to baby plant)

Maize seed

During germination of **maize seed**, the primary root emerges from the seed and grows downwards. The plant's primary leaf emerges and grows upwards and above soil surface.

Stages of germination of maize seed (From seed to baby plant)

Important Things To Know

- Baby plants are obtained from seeds in some plants.
- The process by which young or baby plants grow from seeds is called germination.
- The germination of a seed goes through processes: swelling of seed coat when it absorbs water, sprouting of the root, sprouting of the stem and seed leaves, and the elongation of the root and stem.
- There are differences in the germination of the maize and bean seeds.

END OF LESSON EXERCISE

Answer the questions below

1) What is meant by the term germination?
2) The first stage of germination is the swelling of seed coat when it absorbs water. True or False
3) The seed is a planting material. True or False
4) We can make baby plant from..... of plants.
   a. flowers b. seeds
5) Draw a bean or maize seed.
6) List the stages of germination of a maize seed.
7) List the stages of germination of a bean seed.

Strand 3

SYSTEMS

Sub-Strand 1 – The Human Body Systems

Content Standard:

B4.3.1.1: Recognise that different parts of the human body work interdependently to perform a specific function.

Lesson 15: Parts of the respiratory system in humans

LESSON 15:

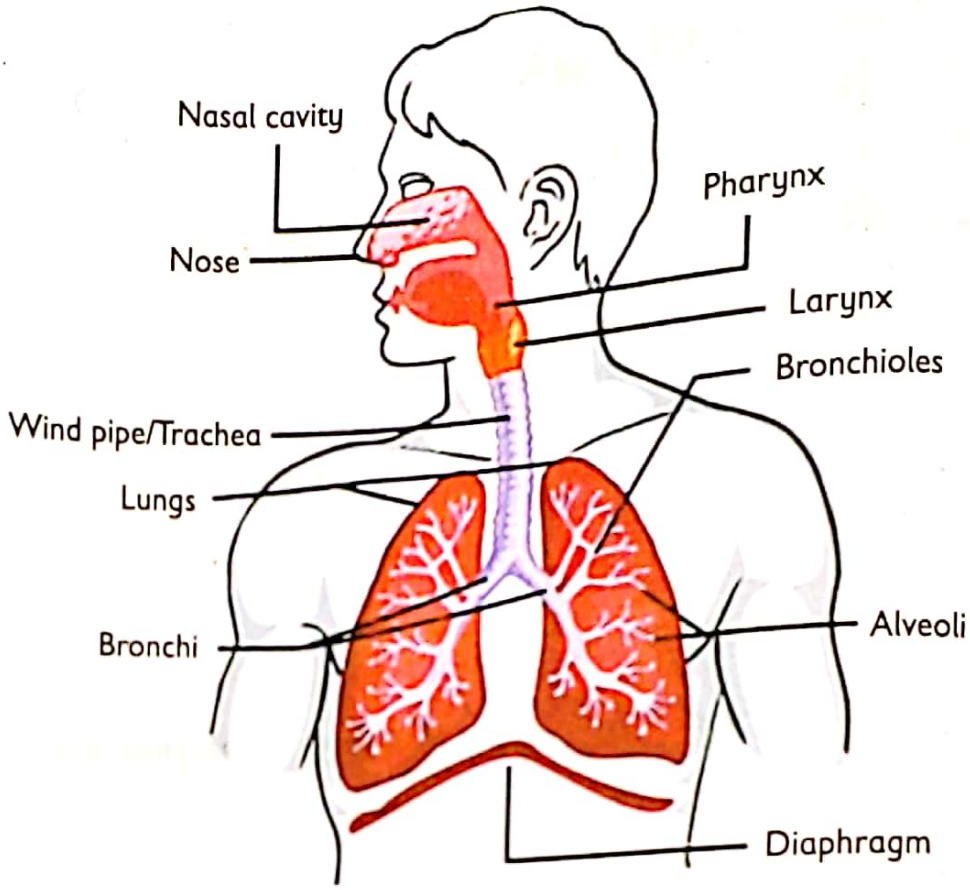
PARTS OF THE RESPIRATORY SYSTEM IN HUMANS

Learning indicator.

1. Know the parts of the respiratory system in humans.

The Respiratory System

The respiratory system helps us to breathe in fresh air and supply oxygen to all parts of the body through the blood. **Respiration** is the process whereby the body uses oxygen to burn food and gives us energy. When we breathe in, oxygen enters our body through the nose. The oxygen burns the food substances taken into the body to release the energy in the food to the body for its functions. The organs in the Respiration system are: **Nose, wind pipe, and lungs.**



Respiratory system of a human being

FUNCTIONS OF THE ORGANS OF THE RESPIRATORY SYSTEM

The main job of the respiratory system is to get oxygen into the body and get waste gases out of the body. It is the function of the respiratory system to transport gases to and from the circulatory system.

The Nose

The air we breathe enters the respiratory system through the nose. The nose filters the air by removing dust particles from the air.

The Trachea Or Windpipe

The trachea or windpipe takes the air into and out of the lungs.

The Lungs

The lungs are the main organs of the respiratory system. The purposes of the lungs are to bring oxygen into the body and to remove carbon dioxide. The blood takes oxygen in the lungs to all the body parts that need it. The blood drops off the oxygen to the body parts, then picks up the carbon dioxide which is a waste gas product produced by the body. The blood transports the carbon dioxide back to the lungs and we breathe it out when we exhale.

The Diaphragm

The diaphragm has the following functions:

i. The diaphragm controls the flow of air into the lungs.
ii. It helps in breathing.

Breathing (External Respiration or Gaseous Exchange)

Breathing involves the exchange of gases between an organism and its surroundings. This is the physical process whereby organism takes in (inhales) oxygen and gives out (exhales) carbon dioxide. The inhaled air has more oxygen than the exhaled air and vice versa.

Mechanism of breathing

The act of breathing involves the movement of both the diaphragm and the ribs, to enlarge or decrease the size of the chest cavity. During the process, the lungs are either filled with air or are made to give up their air.
Specifically, breathing takes place as follows:

Inhaling or respiration. The diaphragm contracts and flattens out. The rib muscles also contracts, causing the ribs to be raised and spread apart. Both of these activities enlarge the chest cavity causing the lungs to expand thus becoming filled with air. The air enters the air sacs, where the exchange takes place.

Exhaling or expiration. The diaphragm relaxes, curving upwards. The rib cage moves down and in, causing your lungs to become smaller compressing the air in the lungs and the air leaves the lungs

Activity 3.0: Demonstrating breathing in and out

What you need: Charts or models of the respiratory system comprising of lungs and diaphragms.

What to do

1. Work in groups.
2. Breathe in and out for some time.
3. Relate the act of breathing to the respiratory system.
4. Examine the chart or model of the respiratory system and identify the organs of the respiratory system.
5. Role-play the functions of parts of the respiratory system, especially the lungs and the diaphragm.
6. Design a breathing model using plastic bags, balloons (for the lungs), rubber bands and polythene bag (as a diaphragm).
7. Draw and label the respiratory system and state its function.
8. Find out the diseases and lifestyles that affect the respiratory system adversely.

PROJECT: Designing an improved breathing apparatus

What to do

1. Work in groups.
2. Use plastics and balloons to design an improved breathing apparatus.
3. Present your work to class for discussion.

Diseases and lifestyles that affect the respiratory system

Some diseases attach the lungs which is the main organ of the respiratory system. Some of them are as follows:

1. **Lung cancer.** This is mainly caused by smoking. It can lead to death.
2. **Asthma.** Asthma is a breathing disorder. It has many symptoms including coughing, wheezing, tightness of chest and breathlessness. Asthma is caused by an allergic reaction to materials in the environment such as dust, cigarette smoke and pollen.
3. **Infectious diseases.** The respiratory system can be attached by serious diseases as tuberculosis, influenza and pneumonia. They enter the lungs with the air that is breathed in.

SUMMARY

- The respiratory system helps us to breathe in fresh air and supply oxygen to all parts of the body through the blood.
- The organs in the Respiration system are: **Nose, wind pipe, and lungs.**
- **Respiration** is the process whereby the body uses oxygen to burn food and gives us energy.
- The energy released for the food keeps the body warm and other activities.
- Breathing is drawing air into (inhaling or inspiration) and expelling it from (exhaling or expiration) the lungs.
- Breathing is aided by the muscles in the diaphragm and between the ribs (intercostal muscles).

END OF UNIT EXERCISE

Answer the questions below

1) Breathing is taking in oxygen and bringing out carbon dioxide in living organisms. **True/false**
2) Respiration helps in breaking down food particles to release energy. **True/false**
3) The byproduct of respiration is energy. **True/false**
4) Breathing is also known as internal respiration. **True/false**
5) Which of the following is the respiration organ of man?

   A. Lungs B. Skin C. Gills D. Mouth
6) State one by-product of respiration.
7) Name two organs of the respiratory system.
8) What is breathing?

SUB-STRAND 2: THE SOLAR SYSTEM

Content Standard:

B4.3.2.1: 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 existence of the solar system

Lesson 16: The components of the solar system (sun, earth, moon, and other planets, satellite)

LESSON 16:

THE COMPONENTS OF THE SOLAR SYSTEM (SUN, EARTH, MOON, AND OTHER PLANETS, SATELLITE)

Learning indicator.

1. Identify the components of the solar system (sun, earth, moon, other planets, satellite).

COMPONENTS OF THE SOLAR SYSTEM

The Sun is one of more than 200 billion of stars. The Sun produces its own light.

The **components of the solar system** are the Sun, Earth, other planets, Moon and satellites.

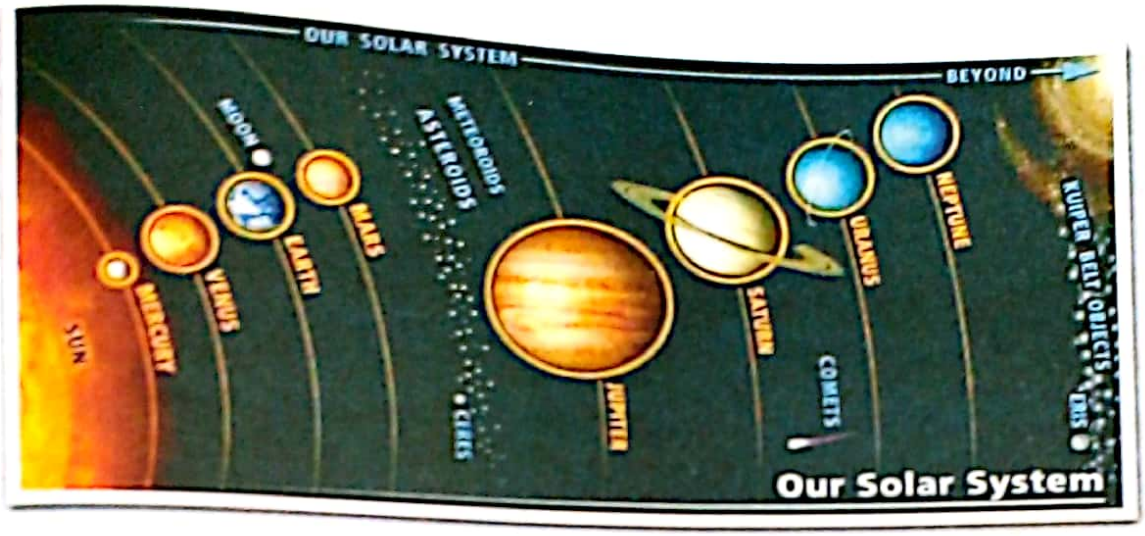
It must be noted that apart from the Sun, the rest of the stars are **not** part of our solar system. Each star has its own solar system made up of smaller heavenly or celestial bodies moving around it.

The Sun does not move but the other heavenly bodies move or revolve round the Sun. Heavenly bodies that move around the Sun are called **planets.**

Generally, there are **eight** planets in the solar system. There are also satellites moving in orbits in the solar system.

The eight planets in their order of increasing distance from the Sun are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune.

Each planet revolves around the Sun along its own path, called an **orbit**. All planets revolve around the Sun in the same direction, anti-clockwise, except Venus which travels in the clock-wise direction.



The solar system

The Earth orbits (moves around) the Sun, leading to changes in seasons. It takes a year for the Earth to move around the Sun.

Mercury is the nearest to the Sun. The Earth is the third from the Sun and Neptune is the furthest from the Sun.

Venus is the brightest object in the sky before sunset or several hours after sunrise.

A **satellite** is a smaller body which moves around a bigger object in space. The Moon is another significant natural satellite of the Earth which is also part of the solar system.

Activity 3.1: Watching a video clip of the solar system

What you need: video clip of the solar system

What to do

1. Work in groups.
2. Watch a video clip on the solar system.
3. Observe the movements of the planets around the Sun.
4. Observe the planet Venus, the brightest object in the sky before sunset or several hours after sunrise.
5. Role-play the Sun and the planets in the solar system.

PROJECT: Designing and making a model of the solar system

Materials needed: Beads, clay moulds, blu track, cardboard and wood

What to do

1. Work in groups.
2. Plan, design and make model of the solar system using suitable materials such as Beads, clay moulds, blu track, cardboard and wood.
3. Present your work to class.

Important Things To Remember

- The components of the solar system are the Sun, Earth, Moon and the other planets.
- There are eight planets in the solar system.
- The eight planets in their order of increasing distance from the Sun are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune.
- A satellite is any small object that moves in an orbit around a bigger object in space.

END OF LESSON EXERCISE

Answer the questions below

1) Name the components of the solar system.
2) The Sun is at the centre of the solar system. **True or False**
3) The stars are part of our solar system. **True or False**
4) List the planets in their order of increasing distance from the Sun.
5) Planets revolve round the ..... in the space.

   A. Moon B. Earth C. Sun D. Stars

6) Name the closest planet to the Sun.

SUB-STRAND 3: ECOSYSTEM

Content Standard:

B5.3.3.1: Show understanding of ecosystem, interdependency of organisms in an ecosystem and appreciate the interactions

Lesson 17: How various organisms are adapted to survive in their habitat

Learning indicator.

1. Know how various organisms are adapted to survive in their habitat.

Introduction

Plants and animals will choose natural homes where they live because of water, food and climate of an area.

A **habitat** is a place where plants or animals live.

An organism's natural habitat has everything it needs to live.

The physical environment also plays a part in an organism's choice of habitat.

Anything that helps an animal or a plant to survive (live and grow well) in its environment is called an **adaptation.**

Some habitats are water, land and air. Some animals and plants live in pond where there is water. Fish and frogs live in water. Some animals and plants live on the land.

In fact, most plants live on the land such as the grassland, garden and forest. Some animals spend most of their time in air and on trees. Some insects, birds and small animals make their homes in trees, that is, in air. Why do fish live in water but not on land? What makes birds fly in the air? This lesson will help us to know why.

Activity 3.2: finding out the adaptations of various organisms

How to go about it

1. Work in groups.
2. Embark on a field trip with your teacher or a tour of the school environment to study about some living places of plants and animals such as: birds and insects on a tree, frogs and fish in a pond or stream, grasshoppers and insects on a grass field, and different plants on a farm.
3. Observe the features of plants and animals in these habitats. What enables frog to move and breathe in water? What enables birds and insects to fly?
4. Brainstorm to come out with the meaning of the term habitat.
5. In class give examples of animals that live in water, land and trees.
6. Do a matching activity using flashcards (with names of different organisms written on them and a list of habitats on another set of flashcards to match with).
7. Discuss how various organisms adapt to their habitat, for example what enables fish to live in water, and birds on trees.

PROJECT: Designing a habitat

How to go about it

1. Work in groups of four.
2. Plan, design and make a model of a habitat using cardboard, paper, blu track and clay mould to show the homes of some animals.
3. Present your work to class.

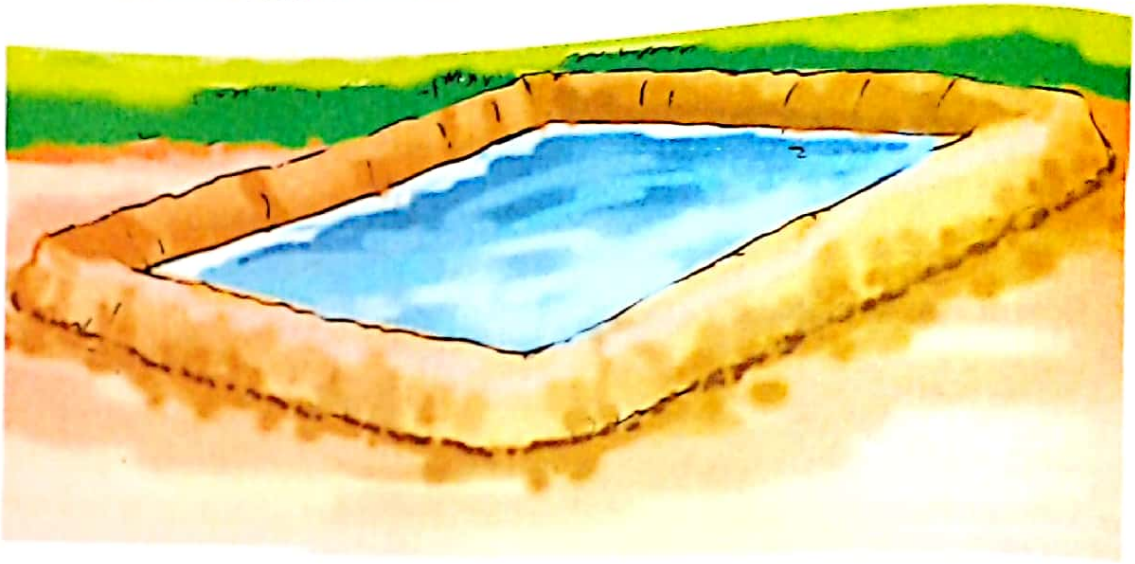
HABITAT AND ADAPTATIONS OF ORGANISMS

There are some natural homes called **habitat** of plants and animals.

Some plants and animals are found or live in ponds where they live in water, or in gardens, farms, and grassland where they live on the land, or in forest where some live on land or in air. There are many kinds of habitats that plants and animals like to live in.

Living things have adaptations to help them survive in an environment. The following are examples of habitats and how the organisms adapt to the type of habitat.

1. The **pond.** The pond is a collection of water at a place. It is the natural home of some animals such as fish, frogs, alligators and some plants.



A pond

Animals which live in water can swim and take in air from the water. The fish breathes through the gills and the fins and the shape of animals help them to swim in water. The feet of frogs are shaped to enable them to move in water.

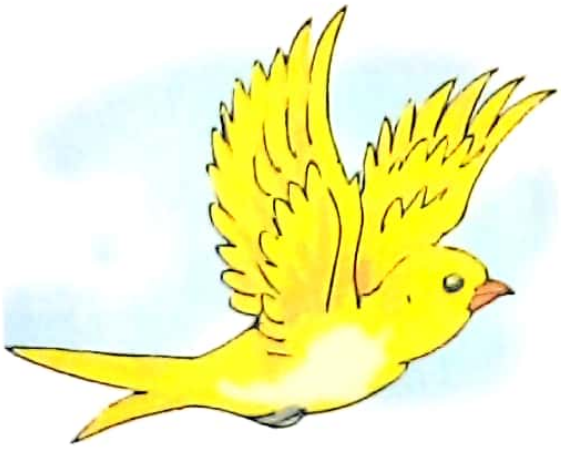
A fish in water

A frog with webbed feet

2. **The garden** is a place where different plants grow on the land. Some insects, reptiles, small animals and birds live in the garden, the birds and some insects stay in the air on the plants in a garden. Some birds and insects can stay in the air because they can fly. Birds have light feathers and wings which help them to fly.

A garden

Some birds and insects can stay in the air because they can fly. Birds have light feathers and wings which help them to fly.



A bird flying

A butterfly

3. **A grass field** is a place where grass and short plants grow on the land.

A grass field

It is the natural habitat for insects such as grasshoppers, bees, ants and butterflies. Animals such as snakes, lizards, rats, grass cutters and antelopes and some birds live in the grass fields. The animals which stay on the land have legs which enables them to run very fast to escape from danger. They also have body covering for protection.

Grasshopper in a grass

Grasscutter eating grass

4. **A forest** consists of big and tall plants and bush. It is the natural home of many plants and animals. Other animals also live on the land in the forest the big and tall plants provide shelter and food for the animals.

A Forest

Some animals such as monkeys, birds, insects and bats stay on the tall plants.

Bats on trees

Monkeys on trees

Important Things To Remember

- A place where the plant or animal lives is called a **habitat.**
- Anything that helps an animal or a plant to survive (live and grow well) in its environment is called an **adaptation.**

- Some plants and animals are found or live in ponds where they live in water, or in gardens, farms, and grassland where they live on the land, or in forest where some live on land or in air.
- There are reasons why plants and animals stay in a particular natural home.

END OF LESSON EXERCISE

Answer the questions below

1) What is a habitat?
2) Name three habitats.
3) How is the fish adapted to live in water?
4) How are some insects adapted to live in air?
5) Name some animals found in a pond.
6) Name some animals found in a forest.

Strand 4

FORCES AND ENERGY

Sub-Strand 1 – Sources And Forms Of Energy

Content Standard:

B5.4.1.1: Demonstrate an understanding of the concept of energy, its various forms, and sources and the ways in which it can be transformed and conserved.

Lesson 18: How energy is transformed from one form to another

Lesson 19: 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

Lesson 20: Relationship between heat and temperature

Lesson 21: Measuring and recording temperature using thermometer

LESSON 18:

HOW ENERGY IS TRANSFORMED FROM ONE FORM TO ANOTHER

Learning indicator.

1. Explain how energy is transformed from one form to another.

Introduction

In the previous years, we learnt that energy is the ability (strength) to do work. Bulbs in our homes are able to produce light, televisions and radios are all able to perform their functions as a result of electricity which serves as a source of energy to them. As human beings, we are able to walk, run, drive, study and do other

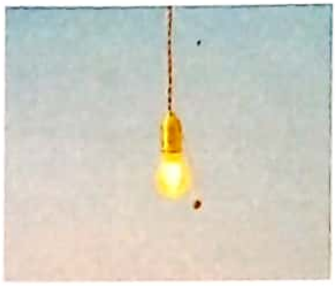
activities in life simply because of the energy we have. There are different forms of energy. The different forms of energy can be transformed from one form to the other.

Forms of Energy

There are different forms of energy. Some of the different forms of energy are; heat, light, sound, potential, kinetic, chemical, electrical, solar and nuclear energy.

1. Light Energy

This is the type of energy which helps us to see. The main and primary source of this type of energy is the sun. Other sources are electric bulb, lighted candle, lamps, torches, etc.



Lighted electric bulb

Lighted candle

Lighted lamp

2. Heat Energy

This is the type of energy which moves from one place to another as a result of the difference in the degree of hotness of the two places. Heat can help to keep the body and other substances warm. Heat can be obtained from burning fire wood and heaters.

Electric heater

Burning firewood

3. Sound Energy

This is the energy produced by vibration of objects. This type of energy is produced from drums, speakers, guitar, trumpet, radio, sirens or horns, etc. When these items or gadgets are played or connected to a source of power they vibrate to produce sound.

Speaker

Radio

Drum

4. Chemical Energy

This is the energy produced from chemical reaction. This type of energy is derived from food, dry cells, accumulators, fuel (LPG, petrol, diesel, kerosene). When we eat food into our body, chemical reaction takes place in the body which digests the food to give energy to the body for its functions. When battery and fuel are connected or put into machines or gadgets, chemical reaction takes place in the battery or the fuel which supply a source of energy to the machine or gadgets to perform its functions.

Plantain

Dry cell

Gas cylinder

5. Electrical Energy

This is a type of energy produced by movement of electric charges in a conductor. The sources of this type of energy are turbines, generators, and solar cells.

6. Potential energy

This is an energy possessed by a body by virtue of its position or state. This is mostly referred to as stored up energy. Thus, objects that are hanging in the air or raised above the ground possesses potential energy.

7. Kinetic energy

This is an energy possessed by a body in motion. Thus, all moving objects possess kinetic energy. Flying birds, aeroplanes, moving cars, bicycles, an athlete running and a moving bullet all possess kinetic energy.

8. Nuclear Energy

This is the energy produced by splitting up the nucleus of an atom.

9. Solar Energy

This is a type of energy produced by the Sun. It is the basic and major source of heat and light energy.

TRANSFORMATION OF ENERGY

Transformation of energy is a situation where energy is changed or converted from one form to the other. For example, changing potential energy to electrical energy, changing heat to electrical energy and chemical energy to light energy.

The following are examples of energy transformations or conversions.

1. Chemical energy to electrical energy to light energy and heat

When a battery is connected to a bulb, the chemical energy stored in the bulb is converted into electrical energy to move through the wire to the bulb. The bulb also glows as soon as the electrical energy enters it. The bulb therefore changes the electrical energy into light energy. As the bulb continues to glow for some time, heat is also produced. This can be summarized as follows:

Chemical energy → Electrical energy → Light energy + Heat energy

2. Chemical Energy to Light Energy

When a torch light is switched on the chemical energy in the batteries is converted to electrical energy which gives light when it passes through the bulb.

Chemical energy → Electrical energy → Light energy

3. Chemical Energy to kinetic Energy

Chemical reaction takes place when the engines of cars or vehicles are turned on. The chemical reaction result in burning the fuel to provide heat. The heat changes into kinetic energy by moving the vehicle.

Chemical energy → Electrical energy → Kinetic energy

Car

Train

Tractor

4. Electrical Energy to Heat

When heaters, electric irons and electric burners are connected to a source of electricity, the electric current is converted into heat energy by the appliances.

Electrical energy → Heat

5. Electrical energy to kinetic energy

When washing machines, blenders, electric fans, etc. are connected to a source of electricity, they convert the electrical energy into kinetic energy.

Electrical energy → Kinetic energy

6. Electrical energy to sound energy

Speakers in sound systems, radios, and electrical bells change electrical energy to sound energy.

Electrical energy → sound energy

7. Solar Energy to kinetic energy and potential energy

The sun produces sun light during the day. Plants use the sunlight to prepare their own food. The plants use some of the food they prepare for their growth and other activities. The excess food is therefore stored by the plants as chemical energy. When the food is eaten it gives us energy to move so the energy stored in food is converted to kinetic energy.

Solar energy ⟶ Chemical energy ⟶ Kinetic energy

Activity 4.0: identifying other forms of energy transformation

What to do

1. Work in groups.
2. Identify other forms of energy transformation in the school community.
3. Present your findings for discussion in class.
4. Design a flow chart to explain how energy from the Sun is transformed into energy for walking.

Important Things To Remember

- There are different forms of energy.
- Any form of energy can be transformed or converted into any other form.
- Any change from one form of energy to another is called an energy conversion or energy transformation.

END OF LESSON EXERCISE

Answer the questions below

1) _____ is a type of energy possessed by a body in motion.
2) The energy that helps us to see is called_____
3) _____is a type of energy that helps us to compose a song.
4) The food we eat gives us_____ energy
5) A person walking possesses potential energy. **True/False**

6) An electric iron can change electrical energy to _____ energy

7) When a mango is falling from a tree its potential energy is turned to _____

8) Which of the following cannot convert electrical energy to sound energy?

A. Speaker B. Radio C. Television D. Electric fan

9) Chemical energy can be changed into mechanical energy by any of the following except

A. Guitar B. Car C. Motor cycle D. Bus

10) Torch lights convert chemical energy to light energy. **True/False**

LESSON 19:

HOW TO USE ELECTRICITY EFFICIENTLY IN THE HOME

Learning indicator.

1. Know how to use electricity efficiently in the home.

Introduction

Every human activity requires the use of energy. We cook, wash, travel, play, dance, create, learn, and teach with the help of energy. Thus, energy is very much important in our daily lives. It therefore requires that we must make very good use of the various forms of energy so that there will be enough for use at all time. Since energy is not created, it means we have limited quantity available for use. Therefore all sources of energy must be used very well. **Energy conservation** is the process of ensuring that the available energy is not misused or destroyed. In this lesson, we shall learn about ways of using electricity efficiently in the home.

Reasons why people dislike light offs (Power outage)

In our domestic homes and factories, electricity is the major source of energy for performing most activities. In the home, electricity is used for cooking, cooling (fans and air conditioners) and lighting and to operate many gadgets. The same applies to our factories. Almost all the machines in our factories are powered by electricity. When there is no electricity, work cannot go on and this makes producers and factory owners uncomfortable. People become worried when there is no electricity because of the following:

1. Our rooms and offices become hot and uncomfortable to live in them.
2. Visibility becomes difficult since there is no light.
3. Factories cannot produce and this will affect the whole economy. Hence, productivity will fall.
4. Food, fish, meat and other things that are preserved by the help of electricity will destroy. Cold store owners will run into huge losses and this will collapse their businesses.

5. There will be no water for domestic and industrial activities. This is because, most water dams use electricity to pump water to household and factories.

Electricity is very important but expensive to produce and it is not always available. Because of the importance of electricity, we need to use it wisely so as to conserve it.

Ways of using electricity efficiently in the home

The following are some of the ways of using electricity efficiently in the home:

1. Turn light and other electrical gadgets off when not in use.
2. Use energy saving bulbs such as fluorescent light rather than incandescent bulbs.
3. Do not turn on several electrical gadgets such as radio, television and computer while you use only one of them.
4. Avoid the use of old electrical gadgets which consumes more electricity.
5. Iron your clothes in bulk.
6. Switch off air conditioner at workplaces, home and in your car when the weather is cold.
7. Avoid the use of faulty electrical appliances especially fridges.
8. Do not open the fridge and deep freezers for a long time
9. Close all windows when the air condition is turned on.
10. Do not use faulty electrical gadget.
11. Do not put hot food in the fridge.

Activity 4.1: Finding out ways of using electrical energy efficiently in the home

What to do:

1. Work in groups.
2. Mention names of things that use electricity in the home.
3. Brainstorm to come out with how electrical gadgets are used in the home.
4. Talk about what happens if electrical gadgets are not switched off when not in use.

5. Discuss the issue of power outages and crisis which come as a result of the inefficient use of electricity in our home and industries.
6. Identify how electricity can be used efficiently in the home, community and school, for example, ironing in bulk, putting off television sets and freezers when ironing, using energy-efficient bulbs and other electrical gadgets with higher energy efficient ratings:(:more stars imply higher energy efficiency).

Important Things To Remember

- Electricity is very important but expensive to produce and it is not always available.
- Because of the importance of electricity, we need to use it wisely so as to conserve it.
- There are ways of using electricity efficiently.

END OF LESSON EXERCISE

Answer the questions below

1) Give three reasons why people get worried when electrical power goes off.
2) Mention four (4) ways of using electricity efficiently at home.
3) All the following are ways of using electricity efficiently except
   a. Using new electrical gadgets
   b. ironing cloths in smaller quantities
   c. Turning off light not in use
   d. using energy saving bulbs
4) The use of incandescent bulbs helps to conserve electrical energy than fluorescent bulbs. **True/False**

LESSON 20:

RELATIONSHIP BETWEEN HEAT AND TEMPERATURE

Learning indicator.

1. Show the relationship between heat and temperature.

Introduction

Our sense of touch helps us to know whether a substance is cold, warm or hot. Two terms associated with hot and cold is heat and temperature. In this lesson we shall learn about the differences between temperature and heat.

Differences between Temperature and heat

Temperature of a body is the degree of hotness or coldness of a body. Our sense of touch is normally used to predict how hot or cold is.

Heat is a form of energy which travels from one place to another as a result of the difference in temperature between the two places.

We feel whether a substance is cold when our body's temperature is higher than that of the substance and vice versa. Therefore, a substance feels cold upon touching when heat moves faster from the body into the substance. We also say a substance is warm when heat moves from the substance into our body upon touching it. If we feel hot upon touching a substance it means heat flows from the substance into our body very fast.

Activity 4.2: Finding out the relationship between heat and temperature

Materials needed: Metal plates, refrigerator, bowl of water, source of heat

How to go about it

1. Work in groups.
2. Touch a piece of metal. Is it cold or hot?
3. Place the piece of metal in the sun on a sunny day for about twenty minutes.

4. Pick the metal. Is it hot or cold?
5. Compare the degree of hotness of the metal before it was placed in the sun and after it was placed in the sun.
6. Place a piece of warm metal picked from the sun into a bowl of water.
7. Touch the metal. Does it feel hotter or colder?
8. Discuss the effect of heat on the temperature of substances.

Effect of heat on temperature of substances

The temperature or degree of hotness of a substance increases when it gains heat. The heat of the Sun increases the temperature of a metal placed in the sun on a very sunny day the metal placed in the sun becomes very hot.

The temperature of a substance decreases when it loses heat. When a warm metal plate placed in the sun is transferred into cold water, the metal loses heat and becomes cold. The cold water instead gains heat from the hot metal.

Things placed in a refrigerator become cold because they lose heat.

Heat affects the temperature of a substance or a body. Thus, how hot or cold a substance or body is depends on the level of heat that has entered or left it.

When heat is lost, temperature reduces, and when heat is gained, temperature increases.

Important Things To Remember

- **Temperature** of a body is the degree of hotness of a body.
- **Heat** is a form of energy which travels from one place to another as a result of the difference in temperature between the two places.
- Heat affects the temperature of a substance or a body.
- How hot or cold a substance or body is depends on the level of heat that has entered or left it.
- When heat is lost, temperature reduces, and when heat is gained, temperature increases.

END OF LESSON EXERCISE

Answer the questions below

1) What is temperature?
2) What is heat?
3) When a substance gains heat its temperature reduces. **True or False**
4) When a substance loses heat its temperature reduces. **True or False**
5) When a metal is placed in the sun it becomes hot. **True or False**

LESSON 21:

MEASURING AND RECORDING TEMPERATURE USING THERMOMETER

Learning indicator.

1. Measure and record temperature using thermometer.

TEMPERATURE AND ITS MEASUREMENT

Temperature or the degree of hotness of a substance can be expressed as a number on a scale of measurement. The types of scales are the Celsius scale, where temperature is measured in degree Celsius (°C) or the Fahrenheit scale, where temperature is measured in degree Fahrenheit.

The instrument for measuring temperature is the **thermometer.**

Types of Thermometers

Thermometers are of different types depending on their uses. We have the **laboratory thermometer** and the **clinical thermometer.** The laboratory thermometer is used in laboratories and the clinical thermometer is used to measure the temperature of the human body. There are two type: the **analogue type** and the **digital type.**

Analogue Clinical thermometer

This is a thermometer used at the hospital or clinics to measure the temperature of patients. The analogue clinical has a special feature called the **kink (constriction)** which helps to hold the liquid in place for the reading to be taken after the thermometer is taken from the patient. The clinical thermometer has scale range of 35 and 43 because of the temperature of human. The normal body temperature of human beings is 37°C.

Digital/clinical thermometer: The thermometer displays the temperature of the body on a screen. Most clinics and hospitals now use this type of thermometer because of the convenience of use.

It uses electronic sensor to measure temperature.

When water is heated, the temperature rises steadily from around 30 until the water boils. It must be noted that water boils at about 100°C

Activity 4.4: Measuring the body temperature using analogue clinical thermometer and digital thermometer

What you need: Analogue laboratory thermometer, digital clinical thermometer, cotton wool, antiseptic liquid

What to do:

1. Work in pairs.
2. Take the analogue clinical thermometer and observe all its features.
3. Shake the thermometer.
4. Place the bulb under your armpit for about three minutes.
5. Remove the thermometer.
6. Hold it vertically.
7. Look at the level of liquid in the glass tube of the thermometer. Does the level drop?
8. Read and record your body temperature.
9. Shake the thermometer and observe what happens.
10. The other pupil also measures his or her body temperature.
11. Compare the two body temperatures. Are they different?
12. Take the digital clinical thermometer and observe its features.
13. Each member of the pair uses it to measure his or her body temperature.
14. Compare the two temperatures. Are they the same?
15. Compare the temperatures with that of the analogue thermometers. Are they nearly the same?

The normal body temperature of a healthy patient is about 37 .

Important Things To Remember

- The instrument for measuring temperature is the thermometer.
- The laboratory thermometer is used to measure temperature of substances in the laboratory.
- The clinical thermometer is used to measure the temperature of patients,
- The normal body temperature of a healthy patient is about 37 .

END OF LESSON EXERCISE

Answer the questions below

1) What is a thermometer?
2) Name two types of thermometers.
3) Water boils at 100 °C. **True / false**
4) The normal body temperature of human beings is 37 °C. **True /False**
5) The degree of hotness of a substance is its temperature. **True/false**
6) The instrument use to measure the temperature of a body or substance is .....
   a. Thermostat
   b. Telestate
   c. Thermometer
   d. Temperature Meter
7) The part of the clinical thermometer which helps to prevent the liquid from falling back is the
   a. bulb
   b. Constriction
   c. stem
   d. capillary scale

SUB-STRAND 2: ELECTRICITY AND ELECTRONICS

Content Standard:

B5.4.2.1: Demonstrate knowledge of generation of electricity, its transmission and transformation into other forms.

Lesson 22: The components of an electric circuit and their functions

Learning indicator.

1. Identify the components of an electric circuit and their functions.

Components of an Electric Circuit

An electric circuit is a path through which electricity flows. An electric circuit have different parts that come together to form the circuit. Electricity flows through every complete circuit. The basic components of an electric circuit are battery, switch, light emitting diode (LED) or a bulb and insulated connecting wires.

Battery Switch LED Bulb Connecting Wire

1. The Battery

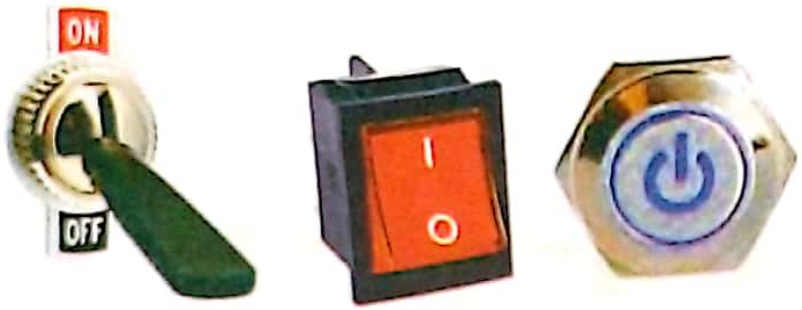
The battery is the energy source of an electrical circuit. The chemical or substance in the battery generates electricity for the circuit. The basic unit of a battery is a dry cell. Two or more dry cells arranged end to end forms a battery. Every battery has two poles. They are the positive end or pole (+) and the negative end or pole (-). Batteries may have different sizes depending on how they may be used. Some gadgets use small batteries, others use medium size or big batteries.

2. Light Emitting Diode (LED)

This is an electric device that converts electricity to light. When electricity flows through LED, it gives light. LED works just like the bulb in our home. We can replace LED with a bulb in a circuit and the bulb will work just like the LED. But LED uses smaller amount of electricity than bulb. LED also has positive and negative poles. The longer poles are known as positive poles and the shorter poles are known as negative poles.

3. The Switch

The switch is a device used to turn the electric circuit on and off. The switch is used to open or close the circuit. When the switch is turned on, we say the circuit is closed or complete. A closed or complete circuit is the one that electricity flows through it. On the other hand, when the circuit is turn off, we say the circuit is opened. Electricity does not flow through an opened circuit.



Different Types of Switch

4. Connecting Wire

This is an insulated rope like metal that connects or joins all the other parts of a circuit together. Connecting wire carries electric current throughout the whole circuit. Wire is mainly made from copper and aluminum. The insulated materials help to prevent electric shock when it touches our body

Making Electronic or Electrical Circuit

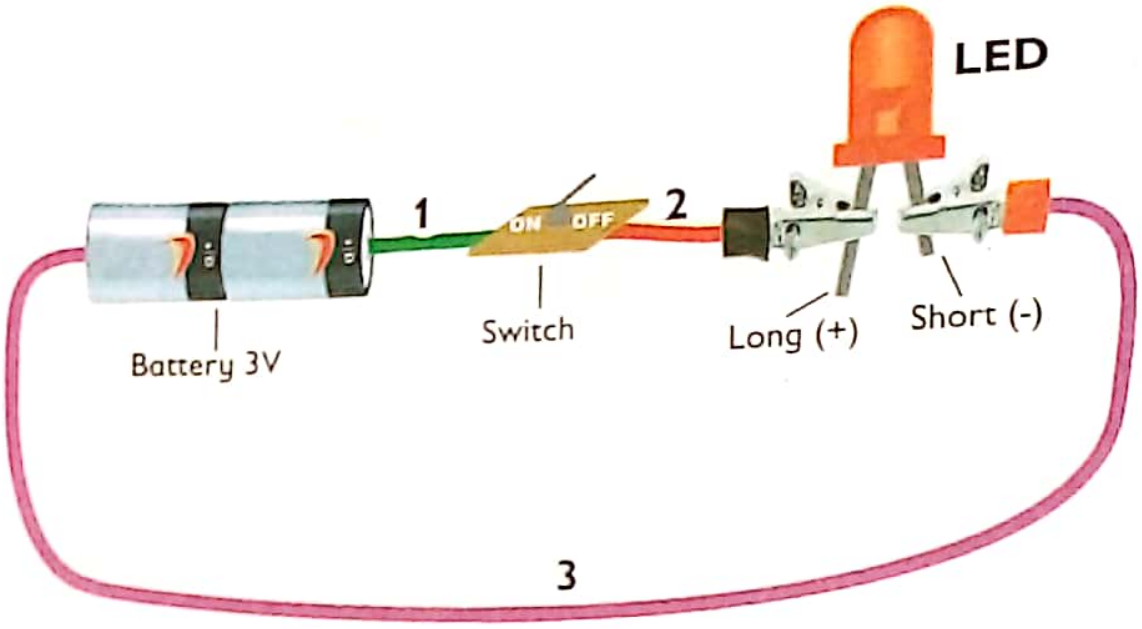
As discussed earlier, that an electronic circuit consists of component parts. The connection of the parts gives a circuit.

Activity 4.5: making a simple electrical or electronic circuit

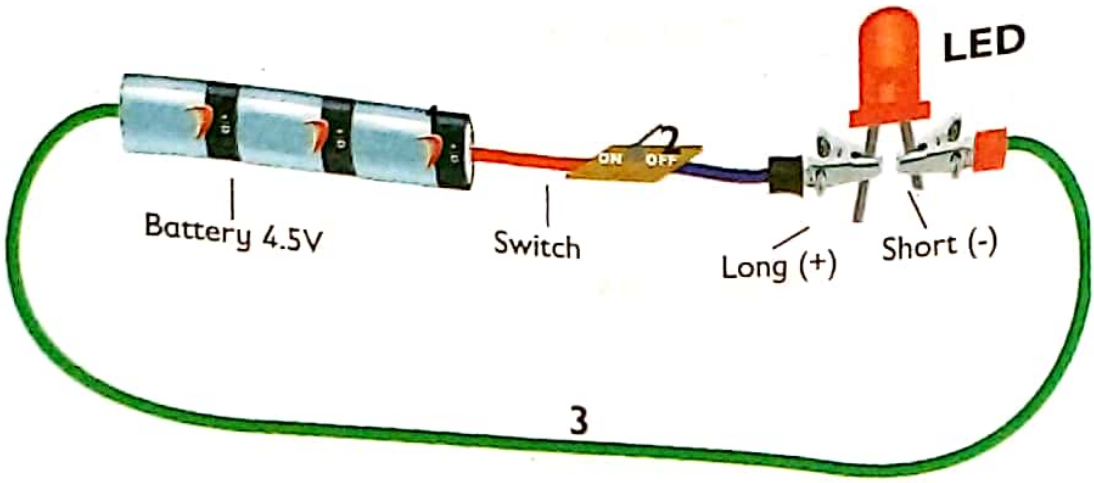
What you need: two or more dry cells to form battery, switch, LED, torchlight bulb, and connecting wire.

What to do:

1. Connect the two dry cells to form a battery with the positive (+) end connected to the negative (-) end.
2. Use one of the wires to connect the negative end of the battery to the negative end of the LED.
3. Connect the positive end of the battery with the wire to the switch and the positive end of the LED.
4. Close the switch and observe what happens to the LED.
5. Open the switch and observe what happens to the LED.



6. Close and open the circuit and observe what happens.
7. Add one more dry cell as shown below.



8. Close and open the circuit and observe what happens?
9. Compare the circuits when the battery was 2 and 3. Which of the circuits was brighter?
10. Replace the LED with the bulb in the two circuit and observe its brightness in each case.

General Observation about Electronic Circuit

1. Current flows through the circuit when the switch is turned on.
2. The LED or bulb lights up when the switch is closed
3. The LED or bulb goes off when the switch is opened.
4. The battery provides energy for the circuit.
5. The brightness of the LED or bulb increases in series connection when the number of batteries increases.
6. When the switch is turn on, it is the same as a complete circuit or closed circuit. Also an open circuit is the same as when the switch is turn off.

PROJECT: Building an LED lantern

What to do

1. Work in groups
2. Build an LED lantern using a simple circuit and a plastic bottle.
3. Present your work to class.

Important Things To Remember

- An electric circuit is a path through which electricity flows.
- The basic components of an electric circuit are battery, switch, light emitting diode (LED) or a bulb and insulated connecting wires.

END OF LESSON EXERCISE

Exercise A

Answer the questions below

1) Electric current moves through a circuit. _____ (True/ False)

2) The part of the circuit that provides energy is the _____ (LED, Battery)

Exercise B

Answer the questions below

1) A circuit is complete when the switch is turn _____ (on, off)

2) A bulb only lights up when the circuit is _____ (opened, closed)

3) Bulb can be used to replace LED in a circuit _____ (True/ False)

Exercise C

Answer the questions below

1) LED changes electricity to _____ (Sound, Light)

2) Connecting wire is insulated to prevent electrical shocks when touched _____. (True/ False)

3) Write the main function of the following:

   a. Switch

   b. Battery

SUB-STRAND 3: FORCES AND MOVEMENT

Content Standard:

B5.4.3.1: Know that movement is caused by applied forces due to the release of stored energy

LESSON 23:

MEANING OF 'FRICTION', ITS EFFECTS AND APPLICATIONS

Learning indicator.

1. Explain the term 'friction', its effects and applications.

INTRODUCTION

A force is a pull or push on an object. We mostly apply force in our everyday activities. When you want to get water from the fridge you pull the fridge door, you push your door bell for somebody to open the door (gate for you to enter the house), you push your electric switch to put the light on or off.

All the above activities need force before we can do them. Let us look at the illustrations below to see some applications of force in our environment.

Pushing a Car

Kicking a football

Lifting a load

Grinding something

There are different kinds of forces. One of the forces we shall learn in this lesson is frictional force.

Frictional force

Frictional force is a force that opposes the movement between two surfaces in contact. This force acts between two surfaces when they are in contact with each other. This force causes wear and tear.

This type of force is very high when the surfaces of the two objects are rough and the force reduces when the two surfaces are smooth. One usually drives car slowly on wet road to avoid skidding off the road. This is because the wet road is slippery and there is no force to oppose the forward movement of the car.

When one accidentally steps on oil spilled on the floor, the person may slip because the floor is smooth and there is no friction to oppose the backward movement of the feet.

Activity 4.6: Demonstrating friction

What you need: Worn-out shoes, rough wooden surface, smooth or polished wooden surface, toy car

What to do

1. Work in groups.
2. Touch your cheeks with your palms. What do you feel?
3. Rub your palms together for several times and touch your cheeks. What do you feel now?
4. Remove your shoes and observe the soles or heels. What has happened to it? Do you observe any wear and tear? What might have caused it?
5. Take an unused or worn-out shoes and rub the sole on a rough floor and observe what happens to the sole of the shoe.
6. Set a toy car and let it move on a smooth floor or polished wooden surface.
7. Set the same toy to move on a rough surface.
8. Compare the movement of the toy car on the two surfaces. On which surface will it move faster and why?
9. Explain why a person slips on a smooth surface.

You may have observed that when the palms are rubbed against each other, friction produces heat. That is why the cheeks feel warm when touched after

rubbing the palms. The friction between the sole of shoes and the floor when we walk causes tear and wear of the sole of shoes.

One slips when friction is minimum between the feet and the floor.

Uses or Advantages of Frictional Force

Frictional force has the following uses or advantages:

1. Frictional force helps us to walk easily without falling. Without frictional force human beings and animals cannot walk. We will slip and fall if there is no frictional force between the ground and our feet.
2. Frictional force helps us to sharpen our knives, cutlasses and other tools.
3. It helps to keep cars on their roads without skidding.
4. It helps cars and bicycles to stop when the brakes are applied.
5. Friction helps us to use our pens and pencils to write on a paper or book.

Disadvantages of Frictional Force

Friction has some disadvantages as well.

1. Frictional force causes the soles of our shoes to wear. This is the reason why we see that the back of our new shoes begins to reduce (wear out) from time to time.
2. It causes wear and tear of machine parts.
3. It produces unnecessary heat. This can be experienced when you rub your hands very fast together.
4. It reduces efficiency of machines

Factors That Causes Friction

1. The nature of the surface in contact. If the surface is rough friction will be high and vice versa.
2. The weight of the object. If the solid object has more weight the friction will be high and vice versa.

How To Reduce / Prevent Friction

Friction between two contacts can be reduced through any of the following ways:

1. Oiling or greasing the surface in contact.
2. Polishing or smoothing the surfaces in contact.
3. We can apply powder to the surface in contact to reduce the friction.
4. We can also water the surface in contact.
5. Using rollers or bearing between surfaces in contact

PROJECT: Investigating the effect of friction

What to do

1. Work in groups.
2. Demonstrate the effect of friction by using a toy car on a rough and smooth surfaces.

Important Things To Remember

- Frictional force is a force that opposes the movement between two surfaces in contact.
- There are advantages and disadvantages of friction.

END OF LESSON EXERCISE

Answer the questions below

2) What is frictional force?

3) List three uses of frictional force.

4) Outline three effects of force.

5) Frictional force helps to produce different sound with the guitar. **True / False**

6) Knives and cutlass are sharpened by the help of frictional force. **True / False**

7) The type of force which produce heat in machines is _____

a. Magnetic force
b. Friction force
c. Compression force
d. tension force

NOTES

Strand 5

HUMANS AND THE ENVIRONMENT

Sub-Strand 1 — Personal Hygiene And Sanitation

Content Standard:

B5.5.1.1: Recognise the importance of personal hygiene

Lesson 24: The importance 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

Lesson 25: How to keep washrooms clean

Lesson 26: How to clean the environment regularly

LESSON 24:

THE IMPORTANCE TO WASH CLOTHES REGULARLY

Learning indicator.

1. Know why it is important to wash clothes regularly

Washing Clothes and Underwear

Washing clothes and underwear involves cleaning all dirt from our clothes and underwear by washing them. We wash our clothes with soap and water. Wearing clean clothes makes us look clean and neat. Proper washing of clothes helps to remove all germs, sweat, dust and bad scents from our clothes.

Washing of clothes

Material we need to wash our clothes and underwear are washing soap, washing powder, clean water, bowl or bucket.

Washing powder

Washing soap

A bucket of water

Activity 5.0: To show the proper way of washing our clothes and underwear

What You Need: Dirty clothes and underwear, two buckets, a container of water, soap or washing powder

What to Do:

1. Work in groups.
2. Half fill the two buckets with water.
3. Put the dirty clothes or underwear into bucket A
4. Add some washing powder into bucket A and mix them together.
5. Wash the dresses very well with your hands.
6. Squeeze and put the washed dresses into bucket B filled with water and rinse the dresses properly.
7. Dry the dresses on the drying line by holding them with pegs.
8. Iron the dried dresses before wearing them.

Washing clothes

Drying clothes

Ironing clothes

The Need or Reasons or Importance of Washing Clothes and Underwear

We need to wash our clothes and underwear for the following reasons:

1. It helps to kill all germs in our clothes
2. Wearing washed and well ironed clothes helps us to look neat and clean.
3. It helps to prevent bad smell from our body and clothes.
4. It helps to prevent bacterial infections in our genital areas.

Important Things To Remember

- Washing clothes and underwear involves cleaning all dirt from our clothes and underwear by washing them.
- Wearing clean clothes makes us look clean and neat.
- Proper washing of clothes helps to remove all germs, sweat, dust and bad scents from our clothes.

END OF LESSON EXERCISE

Answer the questions below

1) Name two reasons why we need to wash our clothes.
2) Mention two materials we use to wash our clothes.
3) We use __to wash our dirty clothes. (paste and brush, soap and water).
4) Sweat, dust and sand can make our body and clothes dirty. True/false.

LESSON 25:

HOW TO KEEP WASHROOMS CLEAN

Learning indicator.

1. Know how to keep washrooms clean.

Cleaning Toilet Facilities

Cleaning toilet facilities involves using disinfectants to clean and mop our toilets. We need to clean the sink and any container we use to collect tissues regularly. This helps to kill all germs that cause diseases like cholera and dysentery. A well cleaned toilet prevents flies and cockroaches.

To clean toilet facility involves the following:

1) Flushing the toilet or urine immediately after use.
2) Urinating directly in the toilet bowl.
3) Keeping used tissues in waste containers rather than throwing them on the floor.
4) Regularly removing used tissues and burning them.

A person cleaning the toilet

Activity 5.1: Finding out the proper way of keeping washroom clean

Materials needed: Pictures and video clip on how to keep washrooms clean, gloves, disinfectants and brushes.

How to go about it.

1. Work in groups.
2. Watch pictures and videos on how to keep washrooms clean.
3. Discuss how to keep the lavatory clean, such as flushing immediately after use, urinating directly in the toilet bowl, keeping used tissues in waste containers rather than throwing them on the floor, regular removing used tissues and burning them.
4. Design a poster to be pasted on the school's washroom.

Important Things To Remember

- Germs stay in washrooms so they must be kept clean all the time.
- We need to clean our toilet facilities or washrooms very well and regularly.

END OF LESSON EXERCISE

Answer the questions below

1) Name one disease you can get from dirty toilet facility.
2) Germs stay in dirty compound _____(True/False)
3) List three ways of keeping the washrooms clean.
4) Give reasons why washroom must be kept clean.
5) List some materials needed to keep the washrooms clean.

LESSON 26:

HOW TO CLEAN THE ENVIRONMENT REGULARLY

Learning indicator.

1. Demonstrate how to clean the environment regularly.

Introduction

Our homes and school compound are the environment we always stay. We interact with our immediate environment. We play, walk around and eat within the home and school compound. Since we do all our activities in the school or home, we need to keep the compound clean in order to stay healthy. A clean compound ensures a healthy life style.

Clean Compounds

Dirty environment is an environment with dirt, rubbish, choked gutters, flies, and mosquitoes. Diseases such as malaria, cholera and diarrhea are very common in dirty environment. People who stay in dirty environments always have ill health.

Dirty compound

To be healthy and strong, we need to keep ourselves and the environment clean. We should do our best to make sure that we stay in clean environment.

Activity 5.2: Demonstrating how to keep the environment clean regularly

What you need: Brooms, hoe, cutlass, rake, mop, brush, soap, detergent, hoover and masks

What to do

1. Work in groups.
2. Make a trip to observe tidy and untidy parts of the nearby community to observe how clean the environment is.
3. Watch different pictures depicting clean and unclean environments.
4. Discuss how to make the unclean environments as clean as those that are clean.
5. Discuss some materials that are used for cleaning the home, the school and the community.

6. Assemble the materials such as brooms, hoe, cutlass, mop, rake, brush, soap, detergent, hoover and masks for cleaning the compound.
7. Teacher to demonstrate the correct way of cleaning tools, example, brooms, rags, ceiling brush, dustpans and dustbins.
8. Discuss the need to keep the environment clean.
9. Use local cleaning tools to clean the classroom and the school environment.
10. Each group should be given a portion of the school compound to work.
11. Each group should perform at least one of the following activities:

- Sweeping
- Weeding
- Scrubbing
- Mopping
- dusting
- Cleaning the gutter

Ways of Keeping the Compound Clean

We must all do our best to stay in clean compound or environment. But before we can keep our compound clean, we must: sweep, hover, mop, scrub, weed and clean our compound.

1. Sweeping

This is cleaning our homes, classroom and compound with broom. Sweeping helps to remove dirt, rubbers, plastic waste and all kinds of rubbish from our compound. Sweeping helps to clean all germs and flies away from our compound.

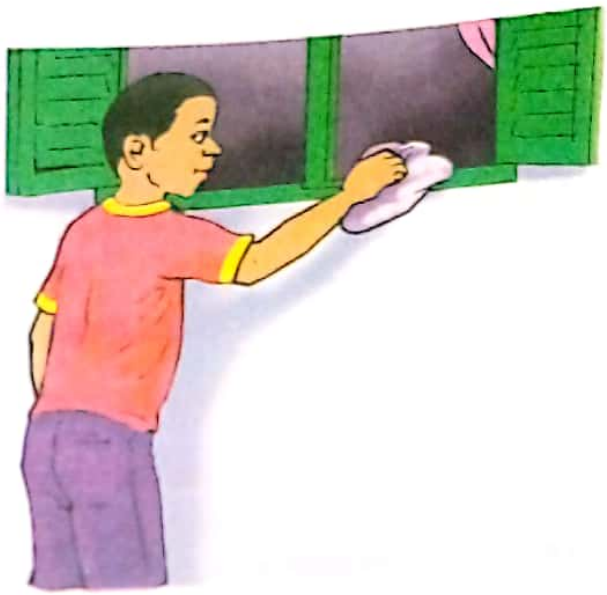
Broom

A person sweeping

Pupils sweeping

2. Dusting

Dusts collect on louvre blades or windows, on doors and on furniture. We keep our compounds clean by using a clean cloth or duster to remove dust from chairs, tables, louvre blades, and doors.



A boy dusting the windows

3. Mopping

This is using rags or mop with disinfectant to wipe the floor. Mopping helps to clean dirt and spilt liquid on the floor. Mopping helps to kill germs and bacteria on the floor. The surface of the floor becomes nice and clean. Frequent mopping helps to protect children who are crawling from germs.

Mop

A person mopping

4. Scrubbing

This is using brush and soapy water to clean the compound. Disinfectants like Dettol and vim are added to the water to help kill all germs.

Brush

A person scrubbing

5. Weeding

This is using cutlass and hoe to clear all unwanted weeds on the compound. Weeding helps to avoid mosquito and snake hide outs.

Cutlass

Hoe

A person weeding

Importance of Keeping the Compound Clean

It is important to keep the compound clean for the following reasons:

1. Clean environment gives good health.
2. Clean environment promotes proper growth in children.
3. It prevents mosquito outbreak.
4. People who stay in clean compound have respect from others.
5. Clean compound prevents disease outbreak.

PROJECT: Designing poster to create awareness on cleanliness

SUB-STRAND 2: Diseases

LESSON 27:

THE CAUSES, SYMPTOMS AND CONTROL OF CHICKEN POX

Learning indicator.

1. Explain the causes, symptoms and control of chicken pox.

Introduction

There are certain diseases that affect the skin directly such diseases are called **skin diseases**. Examples of these diseases are: heat rashes, ringworm, scabies, yaws, foot rot, measles, chicken pox and eczema. Some diseases are also caused by germs that can be transmitted through the air called **air-borne diseases.**

Examples of air-borne diseases are cold, cough, measles, chicken pox and rashes.

In this lesson, we shall focus on the causes, symptoms and control of chicken pox.

Activity 5.3: Finding out causes, symptoms and prevention of chicken pox

Materials needed: Pictures, videos or charts on causes, symptoms and control of chicken pox together with a resource personnel

How to go about it

1) Work in pairs.
2) Watch pictures, videos or charts on causes, symptoms and control of chicken pox.
3) Your teacher may also invite a health personnel or School Health Education Programme (SHEP) coordinator to give a talk on chicken pox.
4) Ask questions based on the pictures and videos or the talk such as:
   i. What causes chicken?
   ii. What are the symptoms of chicken pox?

iii. What should be done if someone has chicken pox?

iv. What are the ways of preventing the spread of chicken pox?

WHAT IS CHICKEN POX?

Chicken pox is infectious disease.

It mainly affects kids. However, adults can also get it.

Cause of chicken pox

The organism that causes chicken pox is a virus. It is highly contagious. A person can get chicken pox easily by touching the skin of someone with an active rash or simply breathing in the virus when someone who is sick of chicken pox sneezes or coughs, sending infected droplets of fluid into the air.

Symptoms of chicken pox

What shows that a person is suffering from chicken pox are itchy rash and red spot or blisters all over the skin. A person with chicken pox also has headache, fever, stomach ache and pains all over the body.

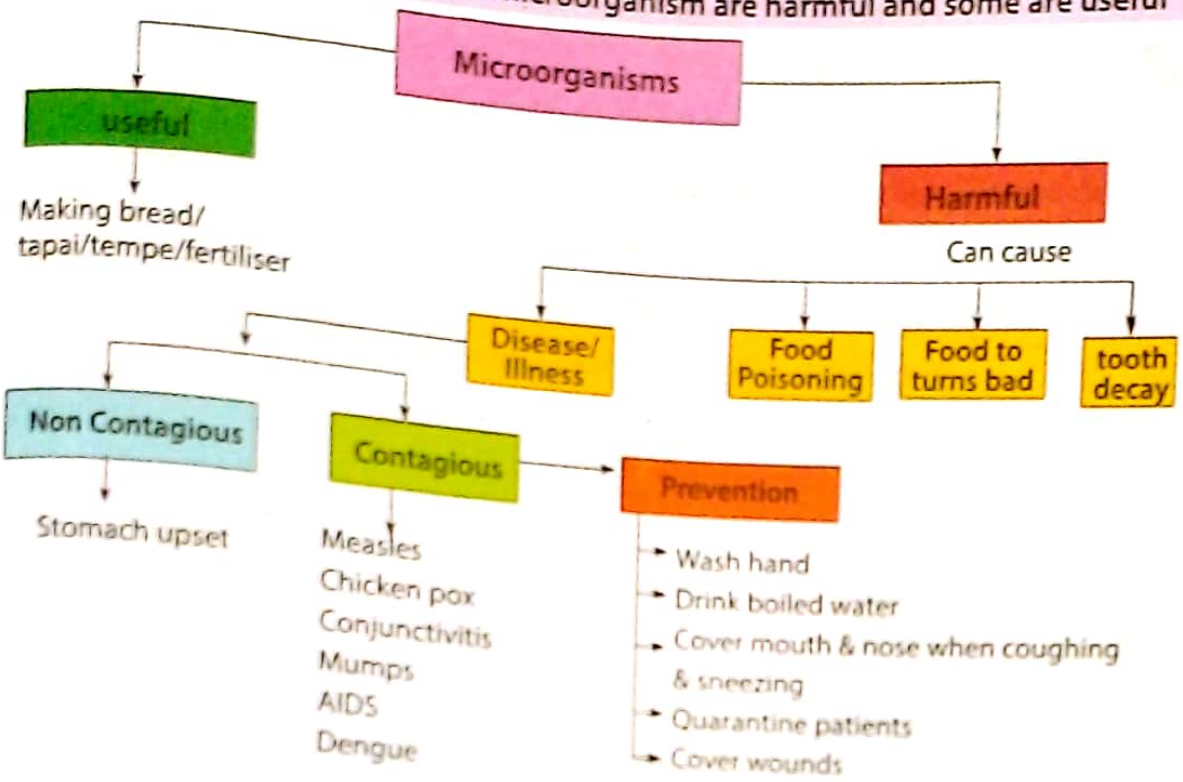
PREVENTION AND CONTROL OF CHICKEN POX

The best way to prevent chickenpox is with the vaccine. Chicken pox vaccine is one of the recommended schedule of children's vaccines. Adults who did not have chicken pox as kids also are usually advised to get the vaccine.

Since chicken pox is contagious, a person can prevent contracting chicken pox by staying away from a person who has the disease, especially if the person is not vaccinated. Adults who did not have chicken pox as kids also are usually advised to get the vaccine.

Concept Map On The Causes, Symptoms And Prevention Of Chicken Pox

1.2 Understanding that some microorganism are harmful and some are useful



PROJECT: Developing concept map to trace the causes, symptoms and prevention of chicken tpox

What to do

1) Work in groups.
2) Develop a concept map to trace the causes, symptoms, and prevention of chicken pox.
3) Present your work to class for discussion.

Important Things To Remember

- Chicken pox is infectious disease caused by a virus. Symptoms of chicken pox are itchy rash and red spot or blisters all over the skin, headache, fever, stomach ache and pains all over the body.
- The best way to prevent chicken pox is with the vaccine.

- One should stay away from an infected person as long as you are not vaccinated.

END OF LESSON EXERCISE

Answer the questions below

1) What is the cause of chicken pox?
2) List three symptoms of chicken pox.
3) How can chicken pox be prevented?
4) Why is it not advisable to allow pupils suffering from chicken pox to go to school?

LESSON 28:

THE CAUSES, SYMPTOMS AND PREVENTION OF CHOLERA

Learning indicator.

1. Identify causes, symptoms and prevention of cholera.

Introduction

In basic four, we learnt about water-borne diseases, air-borne diseases and food-borne diseases. In this lesson we shall focus on the cause, symptoms and control of cholera.

Activity 5.4: Finding out causes, symptoms and prevention of cholera

Materials needed: Pictures, videos or charts on causes, symptoms and prevention of cholera together with a resource personnel.

How to go about it

1) Work in pairs.
2) Watch pictures, videos or charts on causes, symptoms and prevention of cholera
3) Your teacher may also invite a health personnel or School Health Education Programme (SHEP) coordinator to give a talk on cholera.
4) Ask questions based on the pictures and videos or the talk about the causes, symptoms and control of cholera.
5) Discuss in your group the causes of cholera, using everyday scenarios, for example, eating contaminated food and living in dirty environment.
6) Discuss in your groups and each group should present ideas on the causes, symptoms and prevention of cholera well written on a large cardboard.
7) Display the cardboard in the classroom.

WHAT IS CHOLERA?

This is a highly infectious disease caused by bacteria. It is sometimes classified as a communicable disease since it spreads very easily and faster. It is transmitted through contaminated water and food. Cholera is very common in areas where sanitation and personal hygiene is a great problem.

Causes of Cholera

Cholera is caused by bacteria called **vibrio cholerae** and is transmitted through contaminated water or food.

Symptoms of Cholera

Some symptoms of cholera are as follows:

1. Severe diarrhoea
2. Frequent vomiting
3. Greater loss of water known as dehydration.
4. Increase in body temperature
5. Pain in the abdomen

Prevention and Treatment of Cholera

The following are some ways of preventing and controlling cholera:

1. Drink clean and safe (treated) water.
2. Make sure that left over foods are properly heated before eating.
3. Proper disposal of waste should be ensured.
4. Wash fruits and vegetables properly before eating
5. Buy food from clean environment. Avoid buying foods close to choked gutters where there are a lot of flies.
6. Do not eat uncovered foods.
7. Cholera patients should be immediately isolated
8. Disinfect the clothes and the immediate environment of the patient.
9. Give the patient Oral Rehydration Solution (ORS) to check dehydration. If ORS is not available give the patient salt solution.

NOTE: Do not use too much salt in making the salt solution.

10. Send the patient to the nearest health facility.

Important Things To Remember

- Cholera is an infectious disease that causes severe watery diarrhoea.
- Cholera is caused by bacteria called **vibrio cholerae** and is transmitted through contaminated water or food.
- Symptoms of cholera include severe **watery diarrhoea** accompanied by **vomiting**.
- Cholera can be prevented.

END OF LESSON EXERCISE

Answer the questions below

1) What is the causes of cholera?
2) Name the bacteria that causes cholera.
3) List two symptoms of cholera.
4) State three precautions to be taken to prevent cholera.
5) Explain how clean environment can prevent cholera.
6) Cholera is not a dangerous disease. True or False

SUB-STRAND 3: SCIENCE AND INDUSTRY

Content Standard:

Recognise the impact of science and technology in society

Lesson 29: The Raw Materials Used In Some Local Industries (Kenkey Production, Gari Production, Ceramic And Pottery Production)

Learning indicator.

1. Identify the raw materials used in some local industries (kenkey production, gari production, ceramic and pottery production).

Introduction

There are a number of local industries in our communities. These industries have existed for centuries. Examples of local industries are gari production, Shea butter production, cooking oil production, blacksmith, basketry, carpentry, pottery and ceramic production. The basic raw materials for these industries are available in the community. In this lesson, we shall identify the raw materials for some of these local industries.

Activity 5.5: Identifying the raw materials of some local industries

Materials needed: Videos of local industry sites

How to go about it

1. The teacher will organize a trip with the class to some production sites of local industries in the community such as gari production, kenkey production, shea butter production, ceramic and pottery production, cooking oil production, carpentry and blacksmith sites.
2. Identify the local raw materials used in all these local industries.
3. When in class watch a video clip of the sites of some local industries.

4. Carry out a matching activity where raw materials are matched with their products, for example, the raw material for kenkey is maize.

Some local industries and their raw materials.

The following are some local materials and their raw materials.

1. Gari production

The raw material is cassava.

Cassava

Gari

2. Kenkey production

The raw material is maize

Maize

Kenkey

3. Shea butter production

The raw materials are shea nuts.

Shea nut

Shea butter

4. Pottery production

The raw material in the pottery production is clay.

Clay

Earthen wares

Pot

5. Ceramic production

The raw material is clay.

Clay

Plates and cup

Tiles

6. Palm oil production.

The raw materials are palm fruits.

Palm fruits

Palm oil

7. Basketry

The raw materials for basketry are raffia palm.

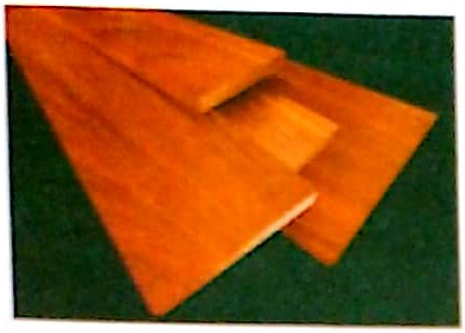
Raffia palm

Chair

Basket

8. Carpentry

The raw material for the carpentry industry is wood.



Wood

Table and Chairs

PROJECT: Designing a local factory

How to go about it

1. Work in groups.
2. Plan and design a factory in your locality, showing the raw materials they use and the finished product.
3. Exhibit your work to class.

Important Things To Remember

- Some local industries in our community are gari production, kenkey production, Shea butter production, blacksmithing, basketry and carpentry.
- There are raw materials for the local industries

END OF LESSON EXERCISE

Answer the questions below

1) List three local industries and their raw materials
2) The raw material for kenkey production is cassava. **True or False**
3) Name the raw material for carpentry
4) Name the raw material for gari production.

SUB-STRAND 4: CLIMATE CHANGE

Content Standard:

B5.5.4.1: Know that climate change is one of the most important environmental issue facing the world today

Lesson 30: The impact of deforestation on climate change.

Learning indicator.

1. Identify the impact of deforestation on climate change.

Introduction

In the past years, we have learnt about ways that human activities have contributed to pollute the environment. Some of the activities that are affecting the environment are the burning of fossil fuels and vegetation, mining and dumping of waste into water bodies. In this lesson, we shall learn about deforestation and its effect on climate change.

Activity 5.6: Finding out the importance of trees, the effect of cutting down trees on climate change and how to preserve trees

Materials needed: Pictures and video clip on the cutting of trees for timber, charcoal burning, farming, housing and mining

How to go about it

1. Work in groups.
2. Discuss the importance of trees in the environment.
3. The teacher will organize the class for a nature walk around the school environs to appreciate the importance of trees such as the provision of shades, food, fresh air and production of rain.
4. Brainstorm on what will happen if people continually cut down trees.
5. Discuss the effect of the cutting of trees on climate change.

6. Brainstorm on the measures to be taken to stop people from cutting trees.
7. Plant trees in the school environment and locations within the community.
8. Ensure that the planted trees are maintained.

DEFORESTATION

Deforestation is cutting down of trees without replanting them. Forests are being destroyed for purposes such as farming, surface mining for gold and other minerals, ranching and housing. Some trees are also cut without replanting to obtain wood (timber) and fuel (firewood and charcoal).

Clearing forest for housing

Clearing forest for farming

Logging in a forest for timber

Clearing forest for surface mining

Importance of trees in the environment.

Trees play very important roles for the survival of all living things. Some benefits of trees are as follows:

1. Trees are a source of the release of large amount of water to the atmosphere during transpiration. This helps a lot in the circulation of water in a cyclic manner in the environment, called the water cycle. The transpiration results in a lot of rainfall.
2. Trees absorb a lot of carbon dioxide for the preparation of plant food.
3. The absorption of carbon dioxide reduces the excess amount of carbon dioxide in the environment. The absorption of the excess carbon dioxide in the atmosphere to minimizes the role of carbon dioxide gas in greenhouse effect and global warming.
4. Trees are a source of food for humans and animals.
5. Trees provide fresh air which is rich in oxygen since oxygen is the by-product of the process of food production by plants.
6. Trees provide shade and cool the environment.

Effects of tree-felling on the environment

Deforestation has a lot of consequences for the environment. Some of them are:

1. It affects the rainfall pattern in many areas since the number of plants releasing water vapour into the atmosphere during transpiration reduces.
2. It results in excess carbon dioxide in the atmosphere since the number of trees absorbing excess carbon dioxide for food production is gradually decreasing. The excess carbon dioxide results in the global warming. Global warming is a major cause of climate change such as severe draught in areas and heavy rainfall in other place which previously never experienced such climatic conditions.
3. Cutting of trees seriously affect the interaction between plants and animals (ecosystem).

How to prevent deforestation

1. The frequent cutting of trees for farming, agriculture, wood (timber), fuel (firewood) and housing purposes without replanting must be stopped.
2. Every tree which is cut must be replanted.
3. Tree planting activities must be encouraged throughout the country.

Important Things To Remember

- Deforestation is the cutting of trees and not replanting them.
- Forests are being destroyed for purposes such as farming, surface mining for gold and other minerals, ranching, housing, obtaining wood (timber) and fuel (firewood and charcoal).
- Deforestation leads to global warming which causes climate change.

END OF LESSON EXERCISE

Answer the questions below

1) Explain the term deforestation
2) List three importance of trees.
3) List three reason why people cut down trees.
4) List two effects of deforestation.

Glossary

Atmosphere	a particular environment or surrounding influence
Accumulator	a voltaic battery that stores electric charge
Brittle	not annealed and consequently easily cracked or fractured
Battery	a device that produces electricity
Component	an abstract part of something
Condense	change from a gaseous to a liquid state and fall in drops
Chemical	material produced by or used in a reaction involving changes in atoms or molecules
Contaminate	make impure
Diversity	the condition or result of being changeable
Energy	forceful exertion
Environment	the totality of surrounding conditions
Evaporate	cause to change into a vapor
Ecosystem	a system formed by the interaction of a community of organisms with their physical environment
Electricity	energy made available by the flow of electric charge through a conductor
Force	a powerful effect or influence that produce a change in a physical quantity
Forest	the trees and other plants in a large densely wooded area
Fertilizer	any substance such as manure or a mixture of nitrates used to make soil more fertile
Friction	the resistance encountered when one body is moved in contact with another
Germination	the process whereby seeds or spores sprout and begin to grow
Heat	a form of energy that is transferred by a difference in temperature

Habitat	the type of environment in which an organism or group normally lives or occurs
Hydrology	the branch of geology that studies water on the earth and in the atmosphere
Industry	the people or companies engaged in a particular kind of commercial enterprise
Interdependent	mutually dependent
Liquid	a substance that is liquid at room temperature
Material	the tangible substance that goes into the makeup of a physical object
Mixture	a substance consisting of two or more substances mixed together
Matter	that which has mass and occupies space
Miscible	capable of being mixed
Organism	a living thing that has the ability to act or function independently
Plastic	generic name for certain synthetic materials that can be molded
Pollution	the state of being polluted; the act of contaminating
Precipitate	separate as a fine suspension of solid particles
Polythene	a lightweight thermoplastic; used especially in packaging and insulation
Quarry	a surface excavation for extracting stone or slate
Reversible	something capable of being reversed
Separate	stand between; act as a barrier between
Solar	derived from the sun or utilizing the energies of the sun
Sanitation	a complex of methods or rules governing behavior
Solvent	a liquid substance capable of dissolving other substances
Solute	the dissolved matter in a solution; the component of a solution that changes its state

Snow	precipitation falling from clouds in the form of ice crystals
Symptoms	any sensation or change in bodily function that is experienced by a patient and associated with a particular disease
Transmission	the act of sending message
Transparent	transmitting light; able to be seen through with clarity
Vapour	a visible suspension in the air of particles of some substance
Vaccinate	perform vaccinations or produce immunity