

# NEW AGE SCIENCE

FOR BASIC SCHOOLS

## TEACHER'S GUIDE BOOK

5





## **Preface**

The teacher's guide has been written to assist the facilitator to help learners to acquire the required skills and attitudes and also to help them understand the concepts as explained in the textbooks and workbooks.

The Teacher's Guides have been written to deliver the new curriculum for Basic Schools produced by the Ministry of Education for the National Council for Curriculum and Assessment (NaCCA). It has been developed by an expert team of Ghanaian teachers and educators and its aim is to achieve the content standards and indicators and exemplars of the curriculum and to support the teachers as they work with the learners throughout the six years.

The curriculum uses a learner-centered approach and works to develop the skills that the learner should acquire. The curriculum is designed to help learners acquire both scientific attitudes and process skills and cognitive ability and be able to apply them. The course is activity-based and proceeds on the knowledge that learners learn best when they are actively doing science and not just listening or reading about it.

The Teacher's Guide is designed to support facilitators as they create the facilitating and learning opportunities and activities through which the learners will develop their science skills, their attitudes and cognitive abilities.

For each indicator in the learner's book the guide provides a list of key words introduced in the indicator, advice on lesson planning, materials and resources required for the indicator to enable the facilitator achieve his or her aim. Local materials of low or no cost are suggested.

The facilitators are also provided with different kinds of assessments to enable them find out what the learners know already (diagnostic) and whether they are following the steps as the lesson progresses (progressive)

The answers to these assessment questions and those of study questions in the learners textbook as well as those in the workbook have all been provided in the teacher's guide. These will help the facilitator to do his or her work effectively.

School-based Assessment (SBA) is an important feature of the new curriculum. The study questions at the end of each indicator in the learner's book are written in the same line as the SBA. We hope that this will assist the facilitator in their assessment. We hope that you will enjoy using the guide and it will help in your work as a facilitator to help the learners develop their scientific abilities.

## **General Introduction**

Science and Technology is the backbone of social, economic, political and physical development of a country. It is because of this realization that the Ministry of Education through the Ghana Education Service and the National Council for Curriculum and Assessment (NaCCA) has developed the curriculum for basic schools.

Aims and Objectives of Teaching Basic Science in the Primary School.

The curriculum is aimed at shaping individuals to become scientifically literate, good problem solvers, have the ability to think creatively and develop both the confidence and competencies to participate fully in Ghanaian society as responsible local and global citizens. The Science curriculum is designed to help learners to;

- Develop the spirit of curiosity, innovation and critical thinking for investigating and understanding their environment;
- Develop skills, habits of mind and attitudes necessary for scientific inquiry;
- Communicate scientific ideas effectively;
- Use scientific concepts to explain their own lives and the world around them;
- Live a healthy and quality life;
- Develop humane and responsible attitude towards the use of all resources of Ghana and elsewhere
- Show concern and understanding of the interdependence of all living things and the environment in which they live;
- Design activities for exploring and applying scientific ideas and concepts
- Develop skills for using technology to enhance learning;
- Use materials in their environment in a sustainable manner.

## **Rationale for teaching Basic School Science.**

Science forms an integral part of our everyday life, and it is a universal truth that development is hinged on science. Science consists of a body of knowledge which attempts to explain and interpret phenomena and experiences in rational terms. Science has changed our lives and it is vital to Ghana's future development.

To provide quality science education, facilitators must facilitate learning in the science classroom. This will provide the foundation for discovering and understanding the world around us and lay the basis for science and science-related courses of study at higher levels of education. Learners should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave and analyse the origins, causes and effects of things in our environment.

Science is also concerned with the development of attitudes, and therefore, it is important for all citizens to be scientifically and technologically literate for sustainable development. Science has to be taught using hands-on and minds-on approaches, which learners will find as fun and adopt as a culture.

## **Philosophy**

### **i. Teaching**

Ghana believes that an effective science education needed for sustainable development should be inquiry-based. Thus science education must provide learners with opportunities to expand, change, enhance and modify the ways in which they view the world. It should be pivoted on learner-centred methodology and learning approaches that engage learners physically and cognitively in the knowledge-acquiring process in a niche and vigorous inquiry-driven environment.

### **ii. Learning**

Science Learning is an active contextualized process of constructing knowledge based on learner's experiences rather than acquiring it. Learners are information constitutors who operate as researchers. Facilitators serve as facilitators by providing the enabling environment that promote the continuation of learners own knowledge based on their previous experiences. This makes learning more relevant to the learner and leads to the development of critical thinkers and problem solvers.

## **Instructional Expectation(Role of the Facilitator)**

1. Guide and facilitate learning by generating discourse among learners and challenging them to accept and share responsibility for their own learning based on their unique individual differences.
2. Select science content, adapt and plan lessons to meet the interests, knowledge, understanding abilities and experiences of learners.
3. Work together as colleagues within and across disciplines and grade levels to develop communities of science learners who exhibit the skills of scientific inquiry and the attitudes and social values conducive to science learning.
4. Use multiple methods and systematically gather data about learners' understanding and ability, to guide science teaching and learning with an arrangement to provide feedback to both learners and parents.
5. Design and manage learning environments that provide learners with time, space and resources needed for learning science.

## **Core Competencies**

These describe a body of skills that teachers at all levels should seek to develop in the learners. There are ways in which teachers and learners engage with the subject matter as they learn the subject. The competencies presented here describe a connected body of core skills that are acquired throughout the process of teaching and learning.

## **Critical Thinking**

This skill helps to develop learners' cognitive and reasoning abilities to enable them analyse and solve problems. This skill enables learners to draw their own experiences to analyse situations and choose the most appropriate out of possible solutions. It requires the learners embrace the problem at hand and persevere and take responsibility for their own learning.

### **Creativity and Innovation**

This skill promotes the development of entrepreneur skills in learners, through their ability to think of new ways of solving problems and developing technologies for addressing the problem at hand. It requires ingenuity of ideas, arts, technology and enterprise. Learners having this skills are also able to think independently and creatively.

### **Communication and Collaboration.**

The competence promotes in learners the skills to make use of language, symbols and texts to exchange information about themselves and their life experiences. Learners actively participate in sharing their ideas. They engage in dialogue with others by listening to and learning from them. They also respect and value the views of others.

### **Cultural Identity and Global Citizenship**

This competence involves developing learners to put country and service foremost through an understanding of what it means to be active citizens. This is done by inculcating in learners a strong sense of social and economic awareness. Learners make use of the knowledge, skills competencies and attitudes acquired to contribute effectively towards the socio economic development of the country and in the global stage. Learners build skills to critically identify and analyse cultural and global trends that enable them to contribute to the global community.

### **Personal Development and Leadership**

This competence involves improving self-awareness and building self-esteem. It also entails identifying and developing talents, fulfilling dreams and aspirations. Learners are able to learn from mistakes and failures of the past. They acquire skills to develop other people to meet their needs. It involves recognising the importance of values such as honesty and empathy and seeking the well-being of others. Personal development and leadership enables learners to distinguish between right and wrong. The skill helps them to foster perseverance, resilience and self-confidence. This skill (PL) helps learners to acquire the skill of leadership, Self-regulation and responsibility necessary for lifelong learning.

### **Digital Literacy(DL)**

The skill develops learners to discover, acquire knowledge and communicate through ICT to support their learning. It also makes them use digital media responsibly.

### **Scope of Content**

The content standards in the curriculum have been carefully selected to introduce learners to the inquiry process of science as well as the basic ideas in science.

The Teacher's Guide are series of books written in a simple easy to read and understand language. Almost every scientific term used is simplified as much as possible. There are simple illustrations, examples, hands-on minds and eyes-on activities which are very necessary in teaching science.

## Organisation of the Teacher's Guide

The Teacher's Guide has been organised to conform with the Learners Text Book. It is made of strands, sub-strands, content standards, Indicators and examples. A unique annotation is used for numbering the learning indicators in the curriculum for the purpose of referencing. An example is shown in the table below.

Annotation	Meaning/Representation
B3	Year or class
2	Strand Number
4	Sub-Strand Number
1	Content Standard Number
2	Indicator Number

**Strands** – the broad areas/sections of the science content to be studied.

**Sub-strand** – the topics within each strand under which the content is organised.

**Content Standard** – the predetermined level of knowledge, skill and attitude that a learner attains by a set stage of education.

**Indicator** – a clear outcome or milestone that learners have to exhibit in each year to meet the content standard expectation. The indicators represent the minimum expected standard in a year.

**Exemplar** - support and guidance which clearly explains the expected outcomes of an indicator and suggests what teaching and learning activities could take to support the facilitators/teachers in the delivery of the curriculum.

The Teacher's Guide has also been organized along the same line. In addition it has an introduction , key words, materials and resources, additional information, diagnostic and progressive assessment and their answers as well as answers to text book study questions.

### Role of the Facilitator ( Before A Lesson)

- Collect materials around the school environment with the help of learners
- Plan the best way to teach the lesson.
- With the help of indicators and exemplars select and plan activities for the learners.
- Try out the activity to find out its suitability to the achievement of the indicators.

The Role of the Facilitator/Teacher (during the lesson)

- Introduce the lesson and give out the materials
- Supervise and guide learners as they perform the activity
- Move round and ask questions or provide clues at times
- Evaluate learners' work

- Act as a co-learner
- Encourage learners when the need arises.

### **The Role of the Facilitator/Teacher (After the lesson)**

- Organize a general class discussion with learners to concretize concepts, skills, attitudes and correct misconception.
- Assess learners by giving them assignment, exercises and quizzes.
- Work assignment, quizzes and exercises

### **The Role of the Learners.**

1. Before the lesson.
  - They may be involved in the collection and gathering of materials necessary for the lesson.
  - They may be involved in the planning of the activities.
2. During the Lesson
  - Learners interact with the materials as they try to find out answers to their own questions and that of the facilitator through the use of the materials.

### **Special Attention Learners**

A class may consist of learners of different physical problems and mental abilities. Some of the learners may have high abilities while others may be slow learners, some may be dyslexic and not able to read or spell well as the others in the class. All these are special needs – learners and need special attention.

Ensure that you give equal attention to all learners in the class to provide each of the equal opportunities for learning. Learners with disabilities may have hidden talents that can only come to light if you provide them with the necessary encouragement and support in class.

### **In the classroom, learners should**

- Communicate among their group members and with the facilitator.
- Record their findings and observation by making models, sketches and drawings and writing.

### **After the lesson**

- Learners participate in general class discussion with the facilitator
- Tidy up the classroom

### **Assessment**

The facilitator must continuously assess himself or herself as well as the learners. This is a process of collecting and evaluating information about learners and using the information to improve their learning.



In this curriculum, it is suggested that the facilitator uses assessment to promote learning and so identifies the strengths and weaknesses of learners to enable him or her ascertain the learners response to instructions.

Assessment is both formative and summative. Formative assessment is viewed in terms of assessment as learning and Assessment for learning.

### **Assessment as Learning:**

It relates to engaging learners to reflect on the expectations of their learning. Information that learners provide the facilitators form the basis for refining teaching-learning strategies.

Learners are assisted to play their roles and to take responsibility of their own learning to improve performance. Learners are assisted to set their own goals and monitor their progress.

### **Assessment For Learning**

This is an approach used to monitor learners' progress and achievement. This occurs throughout the learning process. The facilitator employs assessment for learning to seek and interpret evidence which serves as timely feedback to refine their teaching strategies and improve learners' performance. Learners become actively involved in the learning process and gain confidence in what they are expected to learn.

### **Assessment of Learning**

This is summative assessment. It describes the level learners have attained in the learning, what they know and can do over a period of time. The emphasis is to evaluate the learners' cumulative progress and achievement.

Which assessment the facilitator uses depends on its purpose. Try to select indicators in such a way that you will be able to assess a representative sample from a given strand. Each indicator in the curriculum is considered a criterion to be achieved by the learner. When you develop assessment items based on a representative sample of the indicator taught the assessment is referred to as a 'Criterion-Referenced Assessment'. A facilitator cannot assess all indicators taught in a term. The assessment procedure you use i.e. class assessment, homework, projects etc. must be developed in such a way that the various procedures complement one another to provide a representative sample of indicators taught over a period.

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# STRAND 1: DIVERSITY OF MATTER

## SUB-STRAND 1: LIVING AND NON-LIVING THINGS

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### LESSON 1: LIFE PROCESSES OF LIVING THINGS

Reference: Learner's Book pages 2 - 8

#### Expected Learning Outcomes

- Explain that all living things undergo growth, sensitivity, respiration and excretion.
- Distinguish between how plants and animals undergo these life processes
- Perform experiments to demonstrate some life processes of 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

**Indicators and exemplars:** B5.1.1.1.1 Know the life processes of living things (growth, sensitivity to the environment, respiration and excretion)

**Core Competencies:** Digital Literacy, Creativity and innovation, Personal development and leadership, Communication and Collaboration, Critical Thinking and Problem Solving

**Subject Specific Practices:** Observing, Analysing, Generalising, Evaluating  
Life Processes of Living Things

#### Introduction

The world can be divided into a number of different regions each with its own characteristic plants and animals. All the plants and animals have become adapted to their own surroundings or environment and their lives are linked in a complex web of interdependence. The environment is influenced by many different factors such as temperature, water and light, physical and chemical properties of the soil and the activities of the living things. The study of the relationship between plants, animals and the environment is called ecology.

**Key Words:** sensitivity, growth, respiration, excretion, fertilisation

#### Additional Information

The study of living things is called Biology. All living things show the same basic characteristics of life. These are respiration, feeding, growth, sensitivity to the environment, movement, excretion and reproduction. Human beings also exhibit these characteristics. Some of these characteristics can be observed instantly, especially in animals. Respiration is a characteristic that you can observe taking place in animals immediately you see them. When a dog is breathing you can notice it. Some characteristics take a longer time to observe. Growth is an example,

The illustration above will help you understand growth by observing a seedling and a mature plant of the maize plant.

Viable maize seeds are planted. When favourable conditions (air, water or moisture) and suitable temperature are available, the seeds germinate into seedlings (young maize plants).

The young maize plants grow into mature maize plants under favourable conditions.

The matured maize plants develop flowers (male and female). The male flowers (tassels) develop first and show at the top of the plant. The female flowers develop later and are found in the axils of the leaves.

Pollination (cross pollination) takes place when the wind blows and carries pollen grains from one maize plant to another maize plant. Fertilisation takes place when the pollen grains fall on the stigma. Fertilisation is the fusion of a male gamete with a female gamete to form zygote.

The zygote formed develops to form the maize grains.

The maize grains develop from the cobs which develop from the female flowers. The grains and cobs grow and mature.

The illustration helps you to fully understand growth as one of the basic characteristics of life. You will realise that growth is a slow process and not as rapid as respiration (breathing in and breathing out)

Another life process of living things is respiration. Respiration involves taking in oxygen which is used to break down food substance in the body to release energy and carbon dioxide is breathed out.

### **Starting the lesson**

- Lead learners to go outside the classroom to observe and identify various living and non-living things and discuss their observation
- Engage learners to watch pictures or animated video of indifferent living things, for example birds, insects, trees reptiles and mammals and comment on them.
- Ask learners to identify the names of the living things from the video.
- Use relevant examples and illustrations to demonstrate or explain sensitivity, respiration and excretion as life processes.
- Lead learners to go on a nature walk to observe sensitivity in the mimosa plant when touched. In the absence of this particular plant in a particular community, a video of this plant can be shown to learners.
- Assist learners to understand growth by observing a seedling and a mature plant of the same kind.
- Let learners breathe in and out to demonstrate respiration.

**NB:** Plants show movement within their parts and animals move from place to place.



maize seedling



young maize plant



adult maize plant with fruits

In their groups (4 or 5 in a group) let learners demonstrate respiration. Each member is to breathe air in and out for five seconds. Let them discuss their experience as they breathe air in and out. You will appreciate that it's very important for life.

*Project:*

*In their groups, let them plant a seed and observe its growth pattern.*

**NB:** Read the description a, b, c, d and e in the additional information and it will help you to guide learners to do the project well.

### Summary

All living things show the same basic characteristics of life such as respiration, feeding, growth, sensitivity to the environment, movement, excretion and reproduction

### Diagnostic assessment question

Write down the four main life process of living things.

Plants and animals are all living things. Explain briefly how movement in plants differ from animals.

### Progressive assessment questions

Write down two examples (a) living things (b) non-living things. (c) thing that have never lived.

Answers to diagnostic assessment questions

Growth, sensitivity to the environment, respiration, excretion.

Plants show movement within their parts but animals move from place to place.

### Answers to progressive assessment questions.

Plants, insects, (b) firewood, pencils, paper. (c) rocks, soil, water.

### Answers to Study Questions (Refer to page 7 - 8)

1. There are some basic life processes that all **living things** undergo. One example is the process of **growth** which involves a permanent increase in size. Through the process of **respiration** living things breathe in air. In terms of sensitivity **animals** have sense

organs that help them respond quickly to external stimuli. **Plants** do not have any special organs for excretion.

2.

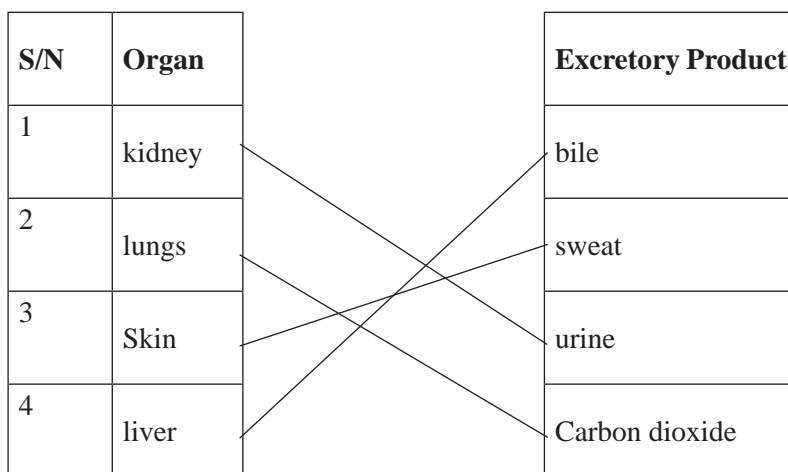
	<b>Dog</b>	<b>Beans</b>
Sensitivity	Fast	Slow
Growth	fast	Slow
Respiration	fast	Slow
Excretion	Has excretory organ	No excretory organ

3. Feeding, feeling, moves by itself

4.

- i. Eye = seeing
- ii. skin = feeling.
- iii. Ear = hearing.
- iv. Nose = smelling
- v. Tongue = tasting

5.



**Diagnostic assessment for facilitator**

1. Was every learner able to identify life processes in living things?
2. Were there some learners who could not identify life processes in living things? What did you do to help such learners?
3. Did you relate the knowledge of the life processes of living things to that of humans?
4. What did you do to cater for digital literacy in your lesson presentation?



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**STRAND 1: DIVERSITY OF MATTER****SUB-STRAND 1: LIVING AND NON-LIVING THINGS**

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**LESSON 2: LIVING THINGS, NON-LIVING THINGS AND DEAD THINGS**

**Reference: Learner's Book pages 9 - 15**

**Expected Learning Outcomes**

- Explain what a living thing is
- Distinguish between living things and non-living things
- Know the difference between living things and dead things
- Classify everyday things as living, non-living or dead

**Content Standard:** B5.1.1.2 Demonstrate understanding of the differences between living things, non-living things, and things which have never been alive

**Indicators:** B5.1.1.2.1 Compare the differences among things that are living, dead and things that have never been alive.

**Core Competencies:** Digital Literacy, Creativity and innovation, Personal development and leadership, Communication and Collaboration, Critical Thinking and Problem Solving

**Subject Specific Practices:** Observing, Analysing, Generalising, Evaluating Living Things, Non-living Things and Dead Things

**Introduction**

A living thing is anything that has life in it and carries out life processes. A non-living thing is anything that does not have life in it and cannot carry out life processes. The things that we see everyday are either living things, non-living things or things that were once alive but are now dead.

**Key words:** Living, non-living, leather

**Additional Information**

Generally, living and non living things are examples of matter. Living things do not always exist as living things. When they die, they become non-living thing. Non-living things will always continue to be non-living things.

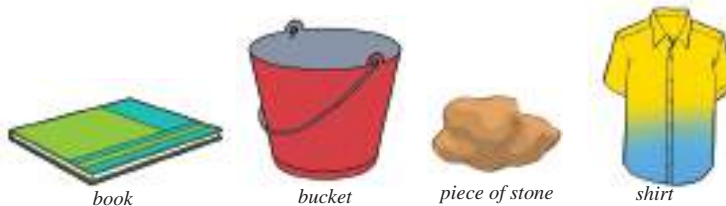
Living things include human beings, goats, sheep, insects, trees, shrubs, grass and others. Non living things are examples of matter.

Non- living things include stones, rocks, books, boxes, cups, spoons, and others.

Living things, plants and animals:

- grow
- breathe
- reproduce
- move
- feed

Other things which do not have the characteristics listed above are living things.



*book*

*bucket*

*piece of stone*

*shirt*

Observing and describing different kinds of things in the environment.

- In groups of four or five let learners assemble the following from your environment and bring them to the class:
  - i. living things, for example, plants, insects.
  - ii. Non living things, for example, firewood, pencils, paper.
  - iii. Things that have never lived, for example, rocks, soil, water.
- Observe and comment on the samples they have brought.
- Classify the materials as follows
  - i. Things that is alive.
  - ii. Things that were once alive.
  - iii. Things that have never been alive.
- Compare the things that are alive, once alive or never been alive.
- In your groups, let them explain why they are classified as living thing

### Dead things

The things we see around us are living things, non-living things or dead things. Dead things are things that were once alive but are no longer living. Example is a piece of wood. Wood was a tree that has been cut down. Since it has been cut down, it cannot grow, eat, or move anymore. So we say it is dead.



*firewood*



*leather*



*dead dog*

Other examples of dead things are firewood, leather and carcass of animals.

## Summary

- The things on the earth are classified as living or non-living things.
- Living things include human beings, goats, sheep, insects, trees, shrubs, grass and others.
- Non-living things include stones, rocks, books, boxes, cups, spoons, and others.
- Living things undergo some life processes such as growth, movement and reproduction.
- Non-living things cannot undergo any life process.
- A dead thing is anything that was once alive, but can no longer undergo life processes. Examples are wood and leather.

## Diagnostic Assessment

Write down two things which were once alive but are no longer alive at the following places:

- i. hospital
- ii. market

## Answers to Diagnostic Assessment

- i. hospital: Dead people at the mortuary, chair, door (any 2 or any other correct things)
- ii. market: fish, cassava tubers, rice, groundnut, pepper, tomato, meat, “kobi” (any 2 or any other correct things)

## Progressive Assessment

1. When you are writing your examination name two things in the examination room which
  - i. are living things
  - ii. are non living things
  - iii. were once alive but are no longer alive







## Answers to Progressive Assessment

- i. Living things: The learners, the teacher
- ii. Non living things: Pen, graphite in the pencil, eraser, nails in the table, roofing sheet, the wall
- iii. Once alive but are no longer alive: Examination booklet, Table, chair, door, window frame

## Answers to Study Questions (Refer to LB page 14 - 15)

1.
  - i. living: goats, sheep, insects, trees, shrubs and grass
  - ii. non-living: stones, rocks, cups and spoons
  - iii. had been alive before: books and boxes
2.
  - i. are living things: Cat, goat, dog, fowl, sheep, housefly, mosquito, cockroach, wall gecko (any 2 or any other 2 correct living things)
  - ii. are non living things: stone, cement block, spoon, ladle, water closet, water, cushion, coins, bottle, bucket, mobile phone, computer (any 2 or any other 2 correct non living things)
  - iii. were once alive but are no longer alive: book, table, chair, leather shoe, wood, “kobi”, Frozen Tilapia,

3.

S/N	Things	Living/non-living/once alive	One reason or characteristic that supports your answer in B
I		Non living	Cannot feed, cannot respire, cannot reproduce
Ii		Non living	Cannot feed, cannot respire, cannot reproduce
iii		Once alive	Cannot feed now but did so in the past, cannot respire now but did in the past, cannot reproduce now but did so in the past
Iv		Living	Can feed, can respire, can reproduce
V		Once alive	Cannot feed now but did so in the past, cannot respire now but did in the past, cannot reproduce now but did so in the past
vi		Non living	Cannot feed, cannot respire, cannot reproduce

vii		Non living	Cannot feed now but did so in the past, cannot respire now but did so in the past, cannot reproduce now but did so in the past
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4. A piece of stone cannot feed, cannot feel, cannot respire, cannot reproduce but a bird can feed, feel, respire and reproduce

**Diagnostic assessment for facilitator**

1. How did you start the lesson?
2. Did you share learning expectations with learners?
3. Can the learners state the learning expectations when asked to do so?
4. Did the learners demonstrate good skills in making comparison between two things?

## STRAND 1: DIVERSITY OF MATTER

### SUB-STRAND 2: MATERIALS

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#### LESSON 3: CLASSIFYING MATERIALS BASED ON THEIR PROPERTIES

**Reference: Learner's Book pages 16 - 25**

##### **Expected Learning Outcomes**

- Know the properties of common materials
- Distinguish between the properties of different materials
- Relate the properties of materials to their uses

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

**Indicators:** B5.1.2.1.1 Classify everyday materials based on their properties (soft, hard, rough, smooth, opaque, transparent and bendable)

**Core Competencies:** Communication and Collaboration, Creativity and innovation, Personal development and leadership, Critical Thinking and Problem-Solving

**Subject Specific Practices:** Observing, Manipulating, Analysing, Evaluating, Generalising, Classifying, Classifying Materials based on their Properties

##### **Introduction**

The fact has been established in the previous year's lesson on materials that materials are important resources for providing human needs. Learners now need to explore more about materials in this lesson. To do this, they need to collect and bring a variety of everyday materials from the home, school and community for this lesson. Learners have to show the materials to you.

**Key Words:** opaque, transparent, bendable

##### **Additional Information**

One needs to be reminded about the fact that the materials surrounding us are important resources for providing human needs. Some examples of different materials surrounding us which are used include:

glass which is a material you can see through (transparent).

paper, black polythene, stone, wood which are materials you cannot see through (opaque).

electric cable, broomstick, cane which are materials that can bend

stone, pen, pencil, table, chair, iron rod which hard materials

cotton wool, piece of cloth, cushion, ripe banana are soft materials  
glass surface, plastic surfaces are smooth materials  
rock, sand, sand paper are rough materials:

### **Properties of materials and their uses**

The properties of a given material enable it to be used for making certain products, for example, clay is used for making pots because it can be moulded without breaking. Raffia palm is used in basketry because it can bend easily. Other examples are:

iron rod is hard and so it is used to construct houses and bridges

glass is used to make windscreen of cars because it is transparent (you can see through it). It is also used to make louvre blades because some glasses are transparent and others are translucent.

Graphite is used to make pencil because it is hard.

cotton wool is used to make pampers because it is soft and can soak water.

transparent plastics are used to make ballot boxes because you can see through them.

wood is used to make furniture because it is hard.

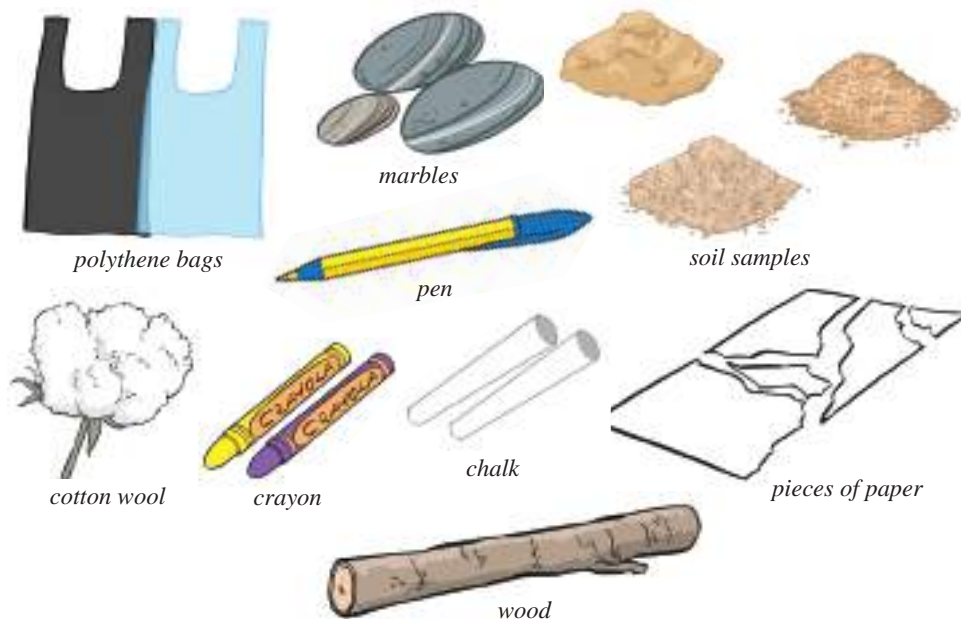
marbles are used to make terrazzo floors, tiles in some houses and also countertops in some stores because they are hard, smooth or rough.

### **Starting the lesson**

You can start this lesson by showing to learners his or her bunch of keys and ask them to state whether it is soft, hard, rough, smooth, opaque, transparent or bendable

Ask learners to collect and bring a variety of everyday materials from the home, school and community the previous day to the day of the lesson as an advance preparation. Examples should include cotton wool, pieces of cloth, pieces of paper, cardboard, wood, plastics, polythene bags (coloured and transparent), soil samples, marbles (rough and smooth) chalk, crayon, pen and straw.

Refer learners to the materials in the diagram on page 18 of the pupils' book and ask them to compare with the materials they collected



Helps learners to

- sort and group the materials they collected based on texture (hard or soft), and size (big or small).
- group materials into those that they can see through (transparent) and those that they cannot see through (opaque).
- Sort the materials into those that can bend and those that cannot bend.
- feel and draw materials that are hard, soft, smooth and rough.
- display their drawings in class for discussion.
- in groups of four or five, classify different materials based on various similarities and differences.

*Project: Tell learners to use different materials to create new items such as paper fans, toy cars, toy planes, cooking pans, hats and earthenware pots and bowls and exhibit their work.*

### Summary

- Different materials have different properties. Materials have different weights, texture, porosity and other characteristics.
- The properties of a given material enable it to be used for making certain products.
- Clay, for example, is used for making pots because it can be moulded without breaking.
- Raffia palm is used in basketry because it can bend easily.



### Diagnostic Assessment

1. Write down one material that is hard and what it can be used for
2. If you are make a flower pot, what property of material will you consider.

### Answers to Diagnostic Assessment

1. Metal. It can be used to make the body ship, aeroplane and cars
2. It must be soft and should be moulded without breaking and must harden after making it.

### Progressive Assessment



1. What material is used to make your school uniform?
2. What is the property of the material used to make your school uniform?

### Answers to Progressive Assessment

1. Textile
2. It is soft

### Answers to Study Questions (Refer to LB page 23 - 25)

1.
  - i. Hard= spoon
  - ii. Soft =mattress
  - iii. Transparent = windscreen
  - iv. Translucent = louvre blade
  - v. Opaque = mirror
  - vi. Rough= sponge
2. Metal for body = hard, cushion for Seat= soft, door= hard, tyre= rough, driving mirror(glass)= opaque, windscreen(glass)= transparent
- 3.

Materials	Properties	One other example
	Hard	Table
	Transparent	Windscreen

	Soft	Clay
	Hard	Key
	Bendable	stick
 bread	Soft	Cake
 stone	Hard	Rock
 fufu	Soft	Kenkey

**Diagnostic assessment for facilitator**

1. In what ways did you engage the learners to develop observation skills?
2. Were the learners able to display observations skills during the lesson?
3. How did your lesson delivery cater for different learner abilities?
4. Did every learner benefit from the lesson?

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**STRAND 1: DIVERSITY OF MATTER****SUB-STRAND 2: MATERIALS**

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**LESSON 4: REVERSIBLE AND IRREVERSIBLE CHANGES**

**Reference: Learner's Book pages 26 - 32**

**Expected Learning Outcomes**

- Explain reversible changes and give examples
- Explain irreversible changes and give examples
- distinguish between reversible and irreversible changes

**Content Standard:** B5.1.2.2 Know that substances can exist in different physical states (solid, liquid, gas). Many substances can be changed from one state to another by heating or cooling

**Indicators:** B5.1.2.2.1 Know that some changes are reversible, while others cannot be reversed

**Core Competencies:** Personal development and leadership, Communication and Collaboration.

**Subject Specific Practices:** Observing, Manipulating, Analysing, Generalising, Classifying Reversible and Irreversible Changes

**Introduction**

There are changes taking place around us everyday. Some of the changes can be reversed, others cannot. Processes are involved which bring about these changes. Heating, cooling, freezing, burning and crumpling are examples of some of the processes that bring about changes.

**Key Words:** Reversible, irreversible

**Additional Information**

Substances can exist in different physical states (solid, liquid, gas). Many substances can be changed from one state to another by either heating or cooling them. Changes where no new thing is formed are reversible, while changes where new things are formed are usually not reversible. Changes which involve chemical reactions are not reversible. This is because chemical reactions produce new substances. When you burn a paper, you cannot get the paper back because it is a chemical change. Physical changes are reversible. This is because no new substance is formed. When you crumple a sheet of paper, it is a physical change. The crumpled paper is not a new substance formed. The sheet of paper can be made straight again. It is therefore a reversible change.

### Starting the lesson

Start the lesson by performing the following activities:

#### Activity 1.2.2.1(a) melting of candle wax

**Materials/Resources (Low or no cost):** candle wax, beaker, heat source

##### Procedure

- Instruct learners to put candle wax into a suitable container. They can use glass beaker.
- Tell learners to place the container on a heat source for about ten minutes and observe what happens to the candle wax.

Ask learners if

- this process can be reversed.
- this activities lead to the formation of a new thing.

Tell learners to discuss their observations with their classmates.



#### Activity 1.2.2.1(b) melting of ice

**Materials/Resources (Low or no cost):** ice block, beaker or saucepan, heat source

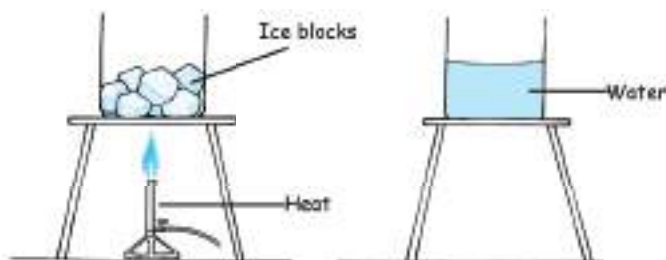
##### Procedure

- Instruct learners to put ice blocks into a suitable container. They can use glass beaker.
- Tell learners to place the container on a heat source for about ten minutes and observe what happens to the ice blocks.

Ask learners if

- this process can be reversed.
- this activities lead to the formation of a new thing.

Tell learners to discuss their observations with their classmates.



**Note:** As the heat is applied, to the container with the ice in it, it changes into water. The change from solid to liquid is known as melting. Solids melt to form liquids. The solid (ice) gains heat and changes into liquid. This is because as the solid (ice) gains heat, the particles move faster and further away from each other. They are now free to move past each other.

### **1.2.2.1(c) melting of shea butter**

**Materials/Resources (Low or no cost):** shea butter, glass beaker or suitable container, heat source

#### **Procedure**

- Instruct learners to put shea butter into a suitable container. They can use glass beaker.
- Tell learners to place the container on a heat source for about ten minutes and observe what happens to the shea butter.

Ask learners if

- this process can be reversed.
- this activities lead to the formation of a new thing.

Tell learners to discuss their observations with their classmates.



### **1.2.2.1(d) heating of water**

**Materials/Resources (Low or no cost):** water, heating source, beaker or any suitable container

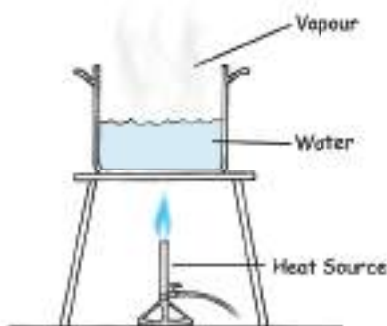
#### **Procedure**

- Tell learners, in groups of four or five, to pour water into a suitable container such as glass beaker or saucepan
- Tell learners to place the container on a heat source for about ten minutes and observe what happens to the water.

Ask learners if

- this process can be reversed.
- this activities lead to the formation of a new thing.

Tell learners to discuss their observations with their classmates.



### 1.2.2.1(e) crumpling of paper

**Materials/Resources (Low or no cost):**

**Procedure**

- Give A4 sheets of paper to each group of learners
- Tell learners, in groups of four or five, to use their two hands to crumple the paper.
- Ask learners if
- this process can be reversed.
- this activities lead to the formation of a new thing.
- Tell learners to discuss their observations with their classmates.



### 1.2.2.1(f) melting of plastics

**Materials/Resources (Low or no cost):** empty pure water sachet, heat source, a pair of scissors, old saucepan

**Procedure**

- Tell learners, in groups of four or five, to cut empty pure water sachet into small pieces.
- Tell learners to put the pieces of the empty pure water sachet into a suitable container. You can use an old saucepan which is no longer used for cooking food.
- Tell learners to place the container on a heat source and heat strongly for about ten minutes and observe what happens to the pieces of sachet.
- Ask learners if

- this process can be reversed.
- this activities lead to the formation of a new thing.
- Tell learners to discuss their observations with their classmates.

### 1.2.2.1(g) burning of paper(this activity can be done outside the classroom)

**Materials/Resources** (Low or no cost):

#### **Procedure**

- Tell learners to organise themselves in groups of four or five.
- Give to learners a piece of paper and matches or lighter.
- Tell learners to lit the match and bring it to the piece of paper to burn it.
- Ask learners to what they have seen
- Ask learners whether this process can be reversed. Ask learners whether this activities leads to the formation of a new thing
- Tell learners to discuss their observation with their classmates



### 1.2.2.1(h) burning of wood(this activity can be done outside the classroom)

**Materials/Resources** (Low or no cost):

#### **Procedure**

- Tell learners to organise themselves in groups of four or five.
- Give to learners a piece of wood like broomstick and matches or lighter.
- Tell learners to lit the match and bring it to the piece of wood to burn it.
- Ask learners to what they have seen
- Ask learners whether this process can be reversed. Ask learners whether this activities leads to the formation of a new thing
- Tell learners to discuss their observation with their classmates

Changes where no new thing is formed are reversible, while changes where new things are formed are usually not reversible.

**NB:** You must make sure that no hazardous chemicals and solutions are used.

### Summary

- Many substances can be changed from one state to another by either heating or cooling them.
- Changes where no new thing is formed are reversible, while changes where new things are formed are usually not reversible.
- Examples of reversible changes are melting of shea butter and freezing of water
- Examples of irreversible changes are rusting of iron nails and burning of firewood.

### Diagnostic Assessment

5. i. What is a (i) reversible change  
ii. irreversible change
6. Write down one example of  
i. reversible change  
ii. irreversible change

### Answers to Diagnostic Assessment

1. i. A change in which no new substance is formed.  
ii. A change in which new substances are formed
2. i. melting of candle  
ii. Burning of charcoal

### Progressive Assessment

1. Name one reversible change you observe in your home
2. Name one irreversible change you observe in your home

### Answers to Progressive Assessment

1. Freezing of water in the deep freezer
2. Burning of LPG gas

### Answers to Study Questions (Refer to LB page 32)

1. Reversible change is a change in which no new substance is formed and the substance formed can change back to the original substance. An irreversible change is a change in which a new substance is formed and the substance formed cannot be changed back to the original substance by any physical means.
2. a) Cooking of rice.  
b) The cooked rice is a new substance formed which cannot change back to the uncooked rice  
c) Freezing of the fruit juice  
d) The frozen fruit juice is not a new substance. It is still a fruit juice which can melt back to the original form
3. i. Heating water  
ii. Burning paper



4.
  - i. shea butter is heated in a saucepan = Reversible
  - ii. ice block is heated in a beaker = Reversible
  - iii. an old newspaper is burnt in fire = Irreversible
  - iv. chalk is grinded into powder = Reversible
  - v. an egg is boiled in water.= Irreversible

**Diagnostic assessment for facilitator**

1. Were you able to present the lesson in order?
2. Did you discuss diagnostic and progressive assessment meant for learners?
3. Were there more hands-on to make use of resources?
4. Did you manage the time well to cater for hands-on activities?

## **STRAND 1: DIVERSITY OF MATTER**

### **SUB-STRAND 2: MATERIALS**

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#### **LESSON 5: SOLID-LIQUID AND LIQUID-LIQUID MIXTURES**

**Reference: Learner's Book pages 33 - 40**

#### **Expected Learning Outcomes**

- Explain how to form solid-liquid and liquid-liquid mixtures
- Demonstrate ability to separate solid-liquid and liquid-liquid mixtures

**Content Standard:** B5.1.2.3 Understand mixtures, the types, formation, uses and ways of separating them into their components

**Indicators:** B5.1.2.3.1 Demonstrate formation and separation of mixtures (solid-liquid and liquid-liquid mixtures)

**Core Competencies:** Personal development and leadership, Communication and Collaboration, Critical Thinking and Problem-Solving

**Subject Specific Practices:** Observing, Manipulating, Analysing, Generating, Reporting

#### **Introduction**

Mixtures exist naturally. Sea water is an example of such mixtures. There are some mixtures which are formed deliberately by combining two or more materials. These materials combined to form the mixture can be separated again.

**Key Words:** decanting, distillation, filtration, Solid-liquid and Liquid-Liquid Mixtures

#### **Additional Information**

We encounter different mixtures in our daily lives. These mixtures are formed by the combination of two or more materials. We can combine some of these materials ourselves and we can also separate them into their components. Different solid-liquid mixtures and liquid-liquid mixtures can be separated using separation methods such as filtration, evaporation, sieving and use of separating funnel. Chalk powder and water can be separated by filtration. Oil and water can be separated by using separating funnel. Sand and gravel can be separated by sieving.

#### **Starting the lesson**

You can start this lesson by referring learners to some common mixtures such as tea which consist of sugar, water and extract from the tea leaf.

Show to learners some solids and liquid substances to observe carefully

Ask learners whether the substances shown to them contains water, common salt, vinegar, sugar, sand, cooking oil and soft drinks.

Tell learners, in groups of four or five, to add each of the substances to a separate quantity of water whilst stirring and observe what happens.

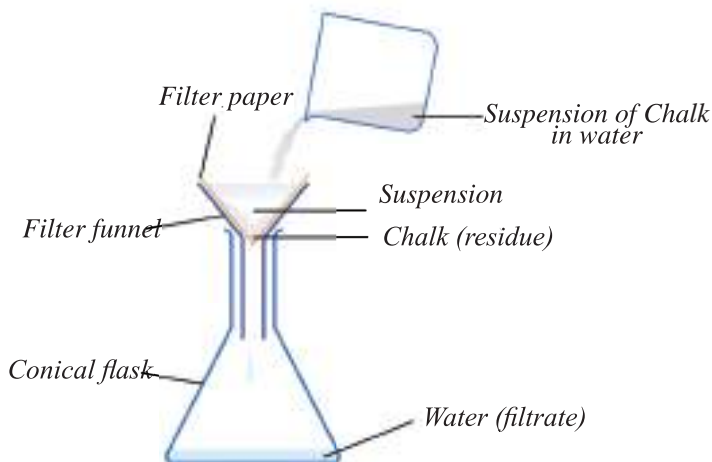
Ask learners how they will describe the material combinations they have produced. Ask learners which of the mixtures are solid-liquid mixture, liquid-liquid mixtures or a solution.

What is the difference between

- i. a mixture of sand and water?
- ii. a mixture of salt and water?

Ask learners to examine the mixture of water and soft drink and the mixture of water and cooking oil and differentiate between them.

Ask learners in their groups demonstrate how to recover the salt from the salt solution.



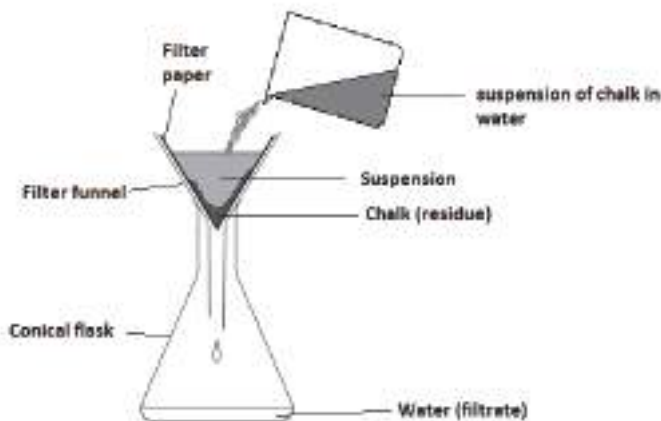
**Activity 1.2.3.1(a): To separate chalk powder and water by filtration.**

**Materials/Resources (Low or no cost):** chalk powder, water, beaker or conical flask and stirrer and heating source.

**Procedure**

- Tell learners to organize themselves into groups of four or five.
- Give to learners the following materials: chalk powder, water, beaker or conical flask and stirrer .

- Helps learners to fold the filter paper and fix it into the funnel.
- Tell learners to hold the funnel in position by clumping it or one member of their group holding it.
- Tell learners to put another beaker or conical flask under the funnel.
- Tell learners to pour the water on the chalk powder in a beaker and stir.
- Tell learners to pour the content of the beaker into the funnel a little at a time.
- Tell learners to observe carefully what is left on the filter paper and what is in the beaker or conical flask.
- Tell learners to discuss their observation with their classmates.



**Figure 1.2.3.1(a) To separate chalk powder and water by filtration**

**Activity 1.2.3.1(b): Separating a mixture of salt and water using evaporation.**

**Materials/Resources (Low or no cost):** salt, water, beaker or evaporating dish, stirrer and heating source

**Procedure**

- Tell learners to organize themselves in groups of four or five.
- Give to learners the following materials: salt, water, beaker or evaporating dish, stirrer and heating source
- Tell learners pour the water on the salt in a beaker or evaporating dish and stir to dissolve.
- Tell learners to put the beaker or evaporating dish on a heat source and heat till all the water evaporates.
- Tell learners to observe carefully what is left behind and discuss their observation with their classmates.

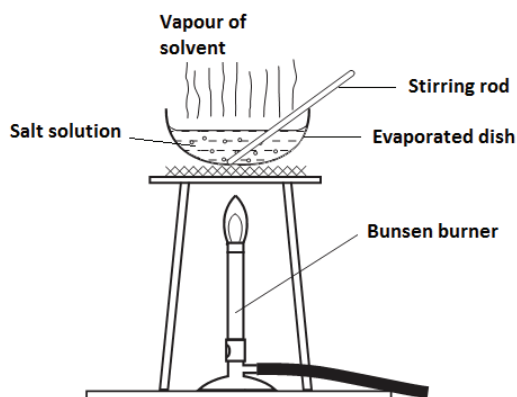


Figure 1.2.3.1(b): Separating a mixture of salt and water using evaporation

**Activity 1.2.3.1(c): To separate a mixture of oil and water using separating funnel.**

**Materials/Resources (Low or no cost):** Oil, water, separating funnel and beakers

**Procedure**

- Give to learners in groups of four or five the following materials: Oil, water, separating funnel and beakers
- Tell learners to mix some amount of water and oil.
- Tell learners to pour in a separating funnel and allow the immiscible liquids to settle down in two layers.
- Tell learners to open the tap to let the liquid at the bottom into the beaker.
- Tell learners close the tap immediately and change the beakers.
- Tell learners open the tap again to collect.
- Ask learners
  - i. which component settled at the bottom
  - ii. which component was collected first

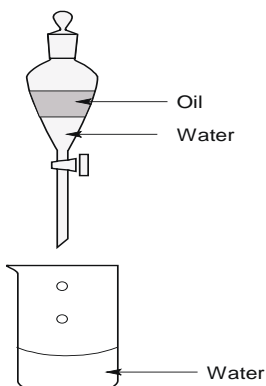


Figure 1.2.3.1(c): Separating a mixture of oil and water using separating funnel

**Activity 1.2.3.1(d): To separate sand and gravel by sieving.**

**Materials/Resources (Low or no cost):** sand, gravel, beaker, stirrer and sieve.

**Procedure**

- Give to learners in groups of four or five the following materials: sand, gravel, beaker, stirrer and sieve.
- Tell learners to add sand and gravel in a container and mixed thoroughly with a stirrer.
- Tell learners to put a container under the sieve.
- Tell learners to pour the mixture of the stone and gravel into the sieve.
- Tell learners to shake the sieve from side to side until no more particles pass through the sieve
- Tell learners to observe carefully what is left on the sieve and what has passed through the funnel into the container.
- Tell learners to discuss their observation with their classmates.

*Project: Separation of solid- liquid mixture: Separate a mixture of sand and water using appropriate materials.*

**NB:** You can use Improvised separation equipment to effectively separate various mixtures

**Summary**

- Solid-liquid mixtures are formed when solids are mixed with liquids. Examples are chalk in water, salty water and muddy water.
- Liquid-liquid mixtures are formed by combining two different liquids. A mixture of kerosene and water, alcohol and water are examples of liquid-liquid mixtures.
- Different solid-liquid mixtures can be separated using separation methods such as filtration, evaporation, sieving
- Liquid-liquid mixtures can be separated through distillation or the use of a separating funnel.
- Powdered chalk and water can be separated by filtration.
- Oil and water can be separated by using a separating funnel.

**Diagnostic Assessment**

1. What is a mixture?
2. What type of mixture can be formed by
  - i. water and saltpetre?
  - ii. water and vinegar?

**Answers to Diagnostic Assessment**

1. A mixture is a substance formed when two or more materials are combined and can be separated again into its constituents by physical means
2.
  - i. Solid- liquid mixture
  - ii. Liquid-liquid mixture

### Progressive Assessment

Mention two methods by which each the following mixtures can be separated

- a. iron filings and water
- b. sand and water

### Answers to Progressive Assessment

- a. Filtration and magnetisation
- b. Filtration and evaporation to dryness

### Answers to Study Questions (Refer to LB page 39 - 40)

1.
  - i. A= Mixture, B = Funnel, C = mixture, D = residue, E = Filtrate, F =Filter paper
  - ii. Filtration
  - iii. To separate the insoluble solid from the liquid
  - iv. Gari and water, sand and water
  
2.
  - i. A. Salt and sugar Reason: A has no liquid but B and C has liquid
  - ii. B. coke and gari Reason: B is solid-liquid but A and C are all liquids
  - iii. B. Evaporation Reason: B separates soluble solid from liquid but A and C separates insoluble solid from liquid
  - iv. C. water and sugar Reason: C is a mixture soluble solid and liquid but A and B are mixtures of insoluble solid and liquid
  - v. B. coke and water Reason: B is a mixture of miscible liquids but A and C are mixtures of immiscible liquids
  
3.
  - i. Water and salt, water and sugar, vinegar and salt, vinegar and salt, water and saltpetre( any 2 or any other two correct ones)
  - ii. Water and sand, water and gari, vinegar and saw dust (any one or any one other correct solid-liquid mixture)
  - iii. Water and vinegar, water and ethanol, petrol and diesel, petrol and turpentine (any 2 or any other 2 correct ones)
  - iv. Water and kerosene, water and diesel, palm oil and water (any 2 or any other two correct ones)
  
4.
  - i. use of a separating funnel=Water and sand, water and gari, vinegar and saw dust(any one or any one other correct solid-liquid mixture)
  - ii. filtration= Water and sand, water and gari, vinegar and saw dust(any one or any one other correct solid-liquid mixture)
  - iii. evaporation= water and sugar, water and salt(any soluble solid and solvent)
  - iv. decanting =Water and sand, water and gari, vinegar and saw dust(any one or any one other correct solid-liquid mixture)
  
5.
  - i. diesel and water= liquid-liquid

- ii. gari and water= solid-liquid
- iii. concrete= solid-solid
- iv. salt solution=solid-liquid

**Diagnostic assessment for facilitator**

1. Did all learners take part in the formation and separation of mixtures?
2. Did the learners exhibit good practical skills during the lesson?
3. Did you listen to the discussion among learners during the activity in each group of learners?
4. Did the learners exhibit critical thinking in their discussion?



## STRAND 2: CYCLES

### SUB-STRAND 1: EARTH SCIENCE

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#### LESSON 6: HOW DAY AND NIGHT ARE FORMED

**Reference:** Learner's Book pages 42 - 46

##### Expected Learning Outcomes

- Know that the earth is constantly moving around the sun
- Recognize that the earth is always rotating on its axis
- Explain how the rotation of the earth causes day and night
- How day and night are formed

**Content Standard:** B5. 2.1.1.1. Recognise that some events in our environment occur recurrently.

**Indicators::** B5.2.1.1.1 Know how day and night are formed.

**Core Competencies:** Creativity and Innovation, Cultural Identity and Global Citizenship, Personal Development and Leadership, Communication and Collaboration.

**Subject Specific Practices:** Observing, Designing, Experiment, Manipulating, Analysing, Representing.

##### Introduction

The earth rotates on its axis. This means it spins round an axis or imaginary line through its centre. The sun is the main source of energy to earth and other planets in the solar system. The energy produced by the sun includes light and heat. Since the earth spins but the sun is fixed, the light to the earth can only be on the earth when it is facing the sun. As part of the earth faces the sun, the other half will be away and there will be no light there. The side facing the sun at a particular time is referred to as day. The side away from the sun where there is no light at that particular time is called night. As the earth continues to spin round, within 24 hours, the other side will also have light and then where there was light will also have darkness and will be night.

**Key Words:** rotation, axis, football, globe, shaded

##### Additional Information

Rotation of the earth around on its axis causes day and night. This is a cyclic movement. Whether it is day or night, it will repeat itself every 24 hours. As the earth rotates slowly, during what is referred to as day time, begins with the morning just when the sun appears on that

half of the earth. As the earth continues to rotate the intensity of the sun's light increases and reaches a peak about 12 noon depending on the part of the earth one finds himself or herself. As the earth continues to rotate by evening it is turning away from the sunlight and the intensity reduces. Then that side becomes night again. And the rotation continues producing night on one half of the earth and day on the other side.

**Materials/Resources** (Low or no cost): Globe, polystyrene balls, football, ice-cream stick, torch, pen, lamp without shade, dark room.

**Procedure**

- Start lesson by calling learners attention to the diagram showing objects that can rotate about an axis. Show learners what is called the axis. Explain that the axis is an imaginary line through the center of the body.
- Use any of the following bodies to demonstrate rotation about an axis; football, pen or ice-cream stick.

**Activity 5.2.1.1.1 (a) To demonstrate rotation using a globe.**

- Demonstrate how the globe can be rotated about the axis through it. Use this activity to explain where the axis passes through and the rotation about it.
- Ask learners in their groups to rotate a plastic ball, a football and a pen about their axis.
- Move round and observes how these activities are performed by the learners.

**Activity 5.2.1.1.1 (c) To show the rotation of the globe about its axis (Learners to perform this activity)**

After learners have observed the you demonstrate rotation of the globe about its axis, ask them to also demonstrate the activity in their groups. One of the group members stands on the opposite side facing the rest of the members. The one learner is going to rotate the globe whilst the rest of the group members look at it from the opposite side. Those facing the globe will be in the night. Move round and help learners to perform the activity.

**Activity 5.2.1.1.1 (d) To demonstrate day and night**

- Learners should be asked to bring a flashlight per group to school.
- Give a globe or a football to each group.
- In their groups, the globe or football is placed on a table at the centre and a flashlight is placed nearby. The flashlight is lit and the light shines on the part of the globe or football facing the flashlight. This part shows the day. The other part will have no light and shows the night. Ask learners to come out with what causes day and night.
- Rotate the globe or football and they will observe how day and night are caused.
- Explain that the flashlight is stationary but the globe or football rotates.
- The flashlight represents the sun whilst the globe or football represents the earth.
- The side facing the sun is day and the opposite side is night.
- End the lesson by asking learners to demonstrate rotation using ice-cream sticks, pen and plastic balls.

**Summary.**

- Day and night occur due to the rotation of the earth on its axis.
- The light from the sun shines on the earth.
- When the sun shines, the side of the earth facing the sun becomes day and the other side night.
- The earth rotates round an imaginary line through its centre called the axis.
- The earth completes one rotation around its axis in 24 hours.

**Assessment Question**

1. Diagnostic
  - i. What causes day and night?
  - ii. Are day and night cyclic movements?

**Progressive**

- i. Why do we have darkness during the night?
- ii. Has the sun got an axis and does it rotate about it?

**Answers to assessment questions**

1. Diagnostic
  - i. Rotation of the earth about its axis.
  - ii. Yes, they are cyclic movements.

**Progressive**

- i. Because that side is turned away from the sun.
- ii. Yes, it has an axis but does not rotate about it.

**Answers to Study Questions (Refer to LB page 45 - 46)**

1.
  - i. True      ii. False      iii. False      iv. False      v. True
2. The illustration above is a globe with a flashlight. Study the diagram and answer questions that follow
  - i. The line shown by the broken lines is called the .....
  - ii. If the globe were the earth and the flashlight, the sun how will you call the part labelled A?
  - iii. How will the part labelled B look like?
  - iv. Globe
3. Study the diagram above and use it to answer the questions that follow
  - i. the earth
  - ii. 24 hours
  - iii. Day and night
  - iv. The sun

**Diagnostic assessment for facilitator**

1. What did you do to make sure every learner benefit from the lesson
2. Were all the learners able to engage in hands-on activity?
3. Were you able to deliver the full content of the lesson within the stipulated time ?
4. Were the learners able to relate the lesson to experiences in daily lives?

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**STRAND 2: CYCLES**  
**SUB-STRAND 1: EARTH SCIENCE**

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**LESSON 7: BENEFITS OF THE SUN**

**Reference: Learner's Book pages 47 - 52**

**Expected Learning Outcomes**

- Identify the benefits of the sun to humans and animals
- Explain the benefits of the sun to plant growth and food production
- Demonstrate an activity to show that the sun supports plant growth

**Content Standard:** B5.2.1.2.1. Recognise the relationship between the earth and the sun.

**Indicator:** B5.2.1.2.1 Describe the benefits of the sun to the earth

**Core Competencies:** Personal development and Leadership, Communication and Collaboration, Critical Thinking and Problem Solving.

**Subject Specific Practices:** Analysing, Evaluating, Communicating, Designing Experiment

**Introduction**

We have learnt that the sun is the source of all energy on earth. The sun produces light and heat among other types of energy. This energy is radiated to earth. It makes the earth warm and also lights up the earth. Otherwise living things cannot stay on earth. We have also learnt that the sun is fixed and the earth rotates round on its axis causing day and night. The side facing the sun is the day and the side away from the sun is night.

**Key Words:** solar, sun, earth, warmth

**Additional Information**

The sun's energy makes the earth warm otherwise the earth will not have been habitable. Temperatures will have been so low that living things could not stay on it. Apart from the warmth given by the sun, it also gives light to the earth. This makes it possible for living things to find their way and move about freely during the day when their side of the earth is faces the sun. The light from the sun is also absorbed by green plants in the process of photosynthesis and used to make plant food. This is the food on which both plants and animals depend for their energy needs. Without the sun, no living thing can obtain energy and therefore there will be no life. It is the sun that causes the wind to blow from hotter places to colder places. All activities on earth therefore depend on the sun's energy.

**Resources/Materials (Low or no cost): Pot with garden soil, seeds, dark cupboard**

**Procedure:**

- Begin lesson by revising the previous lesson on rotation of earth on its axis to cause day and night.
- Ask learners to explain axis and rotation.
- The learners should also talk about what the day is and what the night is.

**Group Work**

*Ask learners in their groups to discuss the benefits the earth derives from the sun. Learners will come out with things such as causing day and night by giving light to earth; causing the wind to blow and making rain to fall.*

*Project Work: To find out whether sunlight makes plants to grow and develop well.*

- Direct learners on the activity. Nurse bean seeds until they develop into seedlings. Ask learners to bring two tins per group to school (empty milo tins)
- Learners fill the milo tins up to about half with garden soil. Give learners guidelines on what to do.
- Place one tin with seedlings at a window in the classroom and the second one in a dark cupboard. They are all watched daily for two weeks' duration.
- The learners observe how the plants grow and develop within the two-week period.
- Ask learners to comment on the two kinds of seedlings by the end of the two weeks.
- Take note that the plants in the dark cupboard could not develop well but those at the window grew with the green colour nicely whilst those in the dark cupboard turned yellowish.
- Learners can conclude that light is important for plants to grow.

**Summary**

- The sun is the source of all energy on earth.
- It keeps the earth warm and lighted for most of the day.
- The sun also gives light for many activities including photosynthesis.
- Plants use sunlight to prepare their food.
- It is this food that animals rely on for their energy.
- Without the sun's energy there will be no life on earth.
- The sun also helps to form day and night and different seasons on the earth.

**Assessment Questions**

1. Diagnostic
  - i. What causes day and night?
  - ii. Name two kinds of energies the earth obtains from the sun.

### Progressive Assessment

- i. How is rain produced?
- ii. What makes plants to grow?

### Answers to Assessment questions

1. Diagnostic
  - i. Rotation of the earth
  - ii. Light and heat
2. Progressive
  - i. Water evaporates from water bodies and forms clouds which then fall as rain.
  - ii. Water from rain and sunlight from the sun.

### Answers to Study Questions (Refer to LB page 52)

1.
  - i. Under sunlight
  - ii. In the dark
  - iii. Plant A is growing well with green leaves but plant B has yellow leaves
2. The sun is the main source of **energy** in the form of light and **heat**.  
Plants use sunlight to produce food through the process of photosynthesis  
The sun also contributes to the formation of rain through the **water** cycle
3.
  - i. To dry materials,
  - ii. causes evaporation of water leading to rainfall,
  - iii. used to generate electricity,
  - iv. makes the earth warm,
  - v. warms water for bathing
4.
  - i. Farmers=dries farm produce for harvest
  - ii. Laundries= dries clothes which have been washed
  - iii. Tanneries =dries tanned material

### Diagnostic assessment for facilitator

1. Were the exemplars used relevant to the lesson?
2. Did you present the lesson in order?
3. Did you discuss diagnostic and progressive assessment meant for learners?
4. Were there more hands-on to make use of resources

## **STRAND 2: CYCLES**

### **SUB-STRAND 1: EARTH SCIENCE**

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#### **LESSON 8: THE WATER CYCLE**

**Reference: Learner's Book pages 53 - 58**

#### **Expected Learning Outcomes**

- Explain how the water cycle occurs
- Identify some key stages within the water cycle
- Distinguish between evaporation and condensation within the water cycle

**Content Standard:** B5.2.1.3 Show understanding of the roles of condensation, evaporation, transpiration and precipitation in the hydrological (water) cycle

**Indicators:** B5.2.1.3.1 Demonstrate evaporation and condensation as important processes of the hydrological (water) cycle

**Core Competencies:** Critical Thinking and Problem-Solving, Creativity and Innovation, Personal Development and Leadership, Communication and Collaboration

**Subject Specific Practices:** Observing, Experimenting, Recording, Generalising

#### **Introduction**

Water exists in three states, namely solid (ice), liquid and gas. We witness these changes from one state to another state in our daily life. These changes take place naturally. They also take place through certain activities of humans. They are very important changes. Evaporation, condensation and precipitation are some of the processes during which these changes take place.

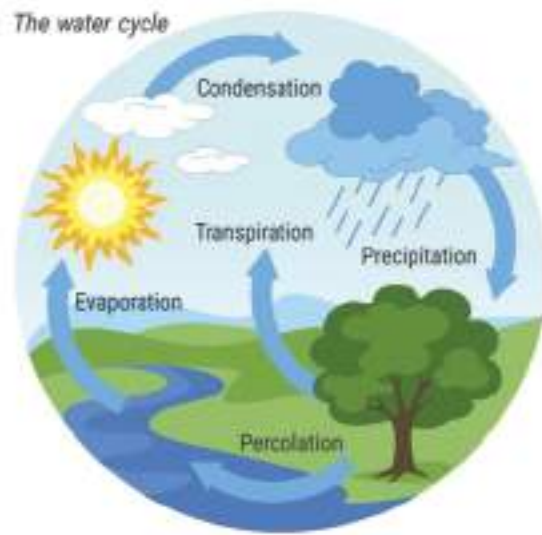
**Key Words:** evaporation, transpiration, condensation, hydrological, precipitation

#### **Additional Information**

Evaporation is the process by which occurs on the surface of water when the water gains energy and escapes into a gaseous phase. When the water in the gaseous phase loses energy it changes back into liquid in a process called condensation. Condensation, evaporation, transpiration and precipitation play important role in the hydrological (water) cycle.

Water from water bodies, the soil and the body of living things evaporates into the atmosphere. When the water vapour cools down, it changes into tiny water droplets in a process called condensation. These tiny droplets combine together to become bigger droplets. As the size of the droplets increases they become so heavy that they can no longer be suspended in the air. They therefore fall to the ground as rain.





**Figure 2.1.3.1: Water cycle showing evaporation and condensation.**

### Starting the lesson

Start the lesson by asking learners to recite a poem about water cycle and the environment. An example of the poem is as follows:

#### Poem

*I am a little tree and my brother is a little animal  
 We have a friend  
 His name is water  
 We are all neighbours  
 We all live in the same compound called environment.  
 Human being is our landlord  
 I need my friend, my brother needs this friend, our landlord also needs this friend.  
 I depend on my brother and my brother depends on me.  
 Our landlord depends on both of us  
 If I die, my brother dies too  
 If my brother dies first I still live on  
 If I die first he dies soon after  
 I tell my brother to take care of me as I take care of him  
 My brother answers me, yes, yes, yes. But wait a minute!  
 There is an enemy, he is our landlord.  
 He is our landlord  
 Let us go and talk to him.  
 He destroys our compound, our environment*

*It is environment that sustains us all.*

*When our friend, water, feels hot he changes and goes up, up and up*

*When our friend in his "high state" feels cold he comes down, down and down and we are all happy, happy and happy again.*

### **Activity 2.1.3.1(a): Demonstrating evaporation**

**Materials/Resources (Low or no cost):** container in which there is water

#### **Procedure**

- Give to learners in group of four or five a container in which there is water.
- Tell learners to let one member of group pour some water on his or her hand while the other members of the group observe
- Tell learners to wait for five minutes and see what happens
- Ask learners what they observe after five minutes
- Ask learners how they will call this process
- Tell learners to record and explain their observation.



### **Activity 2.1.3.1(b): Demonstrating evaporation and condensation**

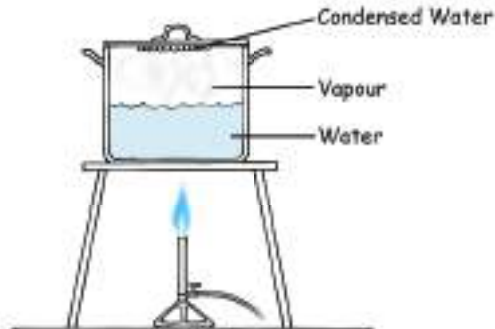
**Materials/Resources (Low or no cost):** water, source of heat, container in which water can be boiled and transparent glass cover

#### **Procedure**

- Give to learners, source of heat, container in which water can be boiled, transparent glass cover and water
- Guide learners in this activity
- Tell learners to pour some water (about  $\frac{1}{4}$  Fanta bottle) into the container.
- Tell learners to place the container on the source of heat.
- Help learners to heat the water until it boils.
- You can then ask learners what they have seen when the water starts boiling
- Ask learners how they will call this process
- Tell learners to record and explain their observation.

- Tell learners to cover the container with transparent glass cover.
- Tell learners to record and explain their observation.
- Ask learners whether they have seen water droplets on the surface of the transparent glass cover

**Note:** As the water boils, it forms water vapour which evaporates. When it hits the transparent glass cover which is relatively cold, it condenses and forms droplets of water.



### Summary

- The water cycle is a continuous process through which water from the earth moves to the clouds and fall back unto the earth.
- The water cycle has some important stages including Condensation, evaporation, transpiration and precipitation.
- Through evaporation, water from different sources move into the sky in the form of water vapour.
- Condensation is the process through which the water vapour is turned back into liquid water droplets. This liquid water eventually falls back as rain.

### Diagnostic Assessment

1. When water escapes in a form of vapour into the atmosphere from plants, it is called.....
2. Name two processes involved in making rain to fall

### Answers to Diagnostic Assessment

1. Transpiration
2. Evaporation and condensation.

### Progressive Assessment

1. Name the process that makes shallow water bodies dry up during harmattan.
2. Identify one process involved during the following activities
  - i. withering of plants during harmattan
  - ii. a bottle half-filled with water, closed tightly and placed under the hot sun.

### Answers to Progressive Assessment

1. Evaporation
2. i. Evaporation/Transpiration  
ii. Evaporation and condensation

### Answers to Study Questions (Refer to LB page 57 - 58)



3. Fill in the blank spaces with the correct answers.
  - i. Evaporation is the process whereby **liquids** turn into **gas** (solids/ liquids/ Gas)
  - ii. Gases **condense** into liquid ( evaporate / condense)
  - iii. Evaporated water from the earth moves up into the ( sun / **clouds**)
  - iv. **Transpiration** is the process through which plants lose water through their leaves. ( transpiration / precipitation )
4. When the food is being cooked, the water evaporates. The water vapour rises and meets a colder surface of the lid which makes it condense to form water droplets on the lid.
5.
  - i. Water from different sources evaporates into the atmosphere.
  - ii. Trees also lose water through transpiration.
  - iii. The water vapour gets into the sky and cools into tiny water droplets through condensation.
  - iv. These tiny droplets combine together to become bigger droplets.
  - v. These droplets eventually fall to the ground as rain or precipitation
6. Explain how each of the following processes help to bring about rainfall
  - i. **Condensation:** The water vapour which gets into the sky by evaporation cools as it meets a lower temperature. The cool water vapour condenses into tiny water droplets through the process called condensation. The tiny water droplets get bigger and fall as rain.
  - ii. **Evaporation:** Water from different sources evaporates into the atmosphere.

**Diagnostic assessment for facilitator**

1. How did you start the lesson?
2. Did you vary your methodology in the course of the lesson?
3. Were the exemplars used relevant to the lesson?
4. What did you do to create the atmosphere for creativity and critical thinking in the course of the lesson?
5. Were learners able to do the assessment task for their workbooks or learner's book?

## **STRAND 2: CYCLES**

### **SUB-STRAND 1: EARTH SCIENCE**

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#### **LESSON 9: HOW CLOUDS ARE FORMED**

**Reference: Learner's Book pages 59 - 64**

#### **Expected Learning Outcomes**

- Know how clouds are formed
- Demonstrate the formation of clouds
- Explain why clouds are formed far away from the earth's surface

**Content Standard:** B5.2.1.3 Show understanding of the roles of condensation, evaporation, transpiration and precipitation in the hydrological (water) cycle CONT'D

**Indicator:** B5.2.1.3.2 Know how clouds are formed

**Core Competencies:** Creativity and innovation, Personal development and leadership, Communication and Collaboration, Critical Thinking and Problem-Solving

**Subject Specific Practices:** Manipulating, Analysing Evaluating, Communicating

#### **Introduction**

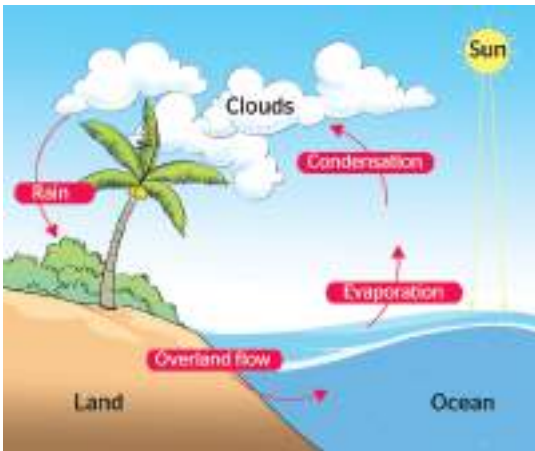
In the daytime, we observe objects such as the sun, birds as well as the clouds in the sky. Sometimes you may not see the sun in the day time sky, but you will always see the clouds. A cloud is a large collection of very tiny droplets of water or ice crystals. The droplets are so small and light that they can float in the air. In this lesson we will learn about how clouds are formed.

**Key Words:** Cirrus, Cumulus, Stratus

#### **Additional Information**

##### **How are clouds formed?**

We see clouds every day. One wonders how it is formed. Many people hardly think that the clouds we see every day are a combination of water and dust particles. Water from the earth evaporates and moves into the sky in the form of water vapour. As time goes on, more and more water vapour moves into the sky. The water vapour condenses onto tiny pieces of dust in the clouds. The condensed water appears as water droplets around these tiny dust pieces. The water droplets finally gather together to become a visible cloud. Clouds are usually white in colour.



### Types of Clouds

The four main types of clouds are stratus, Cirrus, Nimbus and cumulus clouds. The type of cloud formed is based on the amount of water vapour in the air, the temperature and wind.

#### Stratus Clouds

These clouds are formed after a cold. Stratus clouds look like a huge thick blanket covering the sky. .

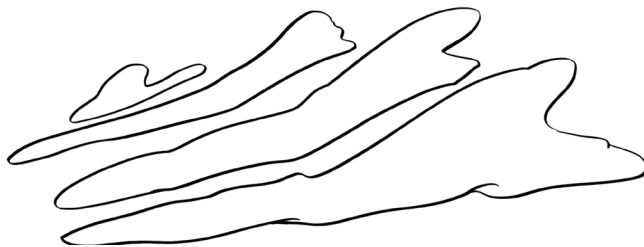


stratus clouds

When you see these clouds in the sky on a warm day, it means the rain will fall shortly. In Europe and other parts of the world, the appearance of stratus clouds in the sky show that snow will fall shortly

#### Cirrus Clouds

These clouds are usually seen in parts of the world where snow falls. Cirrus clouds appear in the sky as thin, light clouds. They are thin because they are made of ice crystals instead of water droplets. Often times, the appearance of cirrus clouds in the blue sky means there will be no rainfall.



cirrus clouds

### Nimbus Clouds

These clouds are dark and are seen during a thunderstorm. They are usually accompanied by heavy rains, thunder and lighting.



nimbus clouds

### Cumulus Clouds

This type of cloud is formed when warm air rises carrying water vapour with it by evaporation. Cumulus clouds can be white or gray. White cumulus clouds means no rain, but when they form into dark or grey clouds, it is going to rain.



cumulus clouds

### Starting the lesson

You can start the lesson reviewing the composition of air with learners which should include water vapour. You can continue the lesson with the following activity:



**Activity: Observing the type of clouds in the sky**

- Tell learners to go out of the class to observe the clouds in the sky
- Tell learners to look carefully to identify the type of cloud that appears in the sky
- Tell learners to write their answer on a sheet of paper
- Tell learners after getting back to the class, to compare their answer to that of their friends
- Tell learners whether they all got the same answers?
- Tell learners to discuss the reason why each of them chose a particular answer

**Activity: Demonstrating formation of clouds in a bottle**

**You need:** a Plastic water bottle with a sports cap, Warm water, Matches



water bottle, bottle sports cap, water, Matches

- Tell learners to pour a little bit of water into the plastic bottle.
- Tell learners put the cap back on, but leave it open.
- Tell learners to light the match and then blow it out so it smokes.
- Tell learners to suck the smoke into the bottle by squeezing the bottle gently a few times and hence close the cap.
- Tell learners to squeeze the bottle and then release it.
- Tell learners to repeat the last step several times.

**What do you expect learners to see?**

When the learners squeeze the bottle, there will be no cloud. When they release the bottle, a cloud will appear. Excite learners with the fact that they have made their own cloud.

**Explain to learners that**

- clouds consist of many tiny water droplets resulting from the condensation of water vapour into liquid water or ice.
- upward vertical motion of air through the atmosphere cools water vapour to form clouds.

### Summary

A cloud is a large collection of very tiny droplets of water or ice crystals. They are formed from water that evaporates from the earth. There are four main types of clouds namely, stratus, nimbus, cumulus and cirrus.

### Diagnostic assessment question

1. What role does dust particles play in cloud formation?
2. Mention three types of clouds
3. Which cloud causes rain to fall?

### Answers to diagnostic assessment questions

1. A cloud is a combination of water and dust particles. Water vapour in the sky condenses into water droplets on tiny particles of dust in the sky which gather together to form cloud.
2. Stratus, Cumulus and Nimbus clouds
3. Nimbus or stratus cloud

### Progressive assessment question

During dry season,

- i. which type of cloud is rare to see?
- ii. common to see?

### Answers to progressive assessment questions

- i. Nimbus and stratus
- ii. Cirrus cloud?

### Answers to Study Questions (Refer to LB page 64)

1. Water from the earth surface evaporate when heated. The water vapour gets into cooler region and condenses into droplets of water. These droplets gather on dust particles suspended in the atmosphere forming clouds.
2. Temperature  
Wind  
amount of water vapour
- 3.

Stratus	Cumulus
<ul style="list-style-type: none"><li>• blanket like covering the sky</li></ul>	<ul style="list-style-type: none"><li>• look white or gray</li></ul>

Nimbus	Cirus
<ul style="list-style-type: none"><li>• Dark clouds</li><li>• appear during thunderstorm</li></ul>	<ul style="list-style-type: none"><li>• Appear as thin light clouds</li><li>• appear when snow is about to fall.</li></ul>

4. Match each type of cloud with its correct description

Type of Cloud	How they look like
Stratus	These clouds are dark and seen during a thunderstorm along with thunder and lightning.
Cirrus	They look like a huge thick blanket covering the sky.
Nimbus	This type of cloud is formed when warm air rises carrying water vapour with it by evaporation
Cumulus	These clouds are the thin, light clouds seen high in the sky. They are thin because they are made of ice crystals instead of water droplets.

5.

- i. Stratus
- ii. That is because it was the rainy season in that area of the world and snow also falls. This is winter time.
- iii. It means snow will fall shortly with rain.

**Diagnostic assessment for facilitator**

1. Did the learners realise the importance of the knowledge of this lesson?
2. What did you do during the presentation of the lesson so that it did appear abstract?
3. What specific skill did your lesson seek to develop in the learners?
4. Were the learners yearning for the lesson to continue even though you have ended it?
5. How did you conclude the lesson?

## **STRAND 2: CYCLES**

### **SUB-STRAND 1: EARTH SCIENCE**

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#### **LESSON 10: USES OF CARBON DIOXIDE AND ITS EFFECTS ON HUMANS AND LIFE ON EARTH**

**Reference: Learner's Book pages 65 - 69**

#### **Expected Learning Outcomes**

- Identify the sources of carbon dioxide on the earth
- Outline some uses of carbon dioxide
- Analyse the harmful effects of carbon dioxide on the earth

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

**Indicators:** B5.2.1.4.1 Describe the uses of carbon dioxide and its effects on humans and life on earth

**Core competencies:** Personal development and leadership, Communication and Collaboration, Critical Thinking and Problem-Solving

**Subject Specific Practices:** Analysing, Evaluating, Communication

#### **Introduction**

Carbon dioxide plays a very important role in the life of all living organisms. Plants use carbon dioxide directly to make food through a process called photosynthesis. Animals do not use carbon dioxide directly like plants. It is when plants use carbon dioxide to make food that animals feed on the food that the plants have made. We can therefore say that animals benefit from carbon dioxide but indirectly. Animals produce carbon dioxide when they respire (breathe in and out). Plants also produce carbon dioxide when they respire but they use all or part of it to make food. There are other processes that produce carbon dioxide. There are other uses of carbon dioxide as well.

**Key Words:** Atmosphere, extinguisher, fizzy, global warming

#### **Additional Information**

You live on earth which is surrounded by an area called the atmosphere. The atmosphere contains a mixture of gases. This mixture of gases is called air. It is this air that supports plant and animal life. Air is made up of the following gases and substances:

- Nitrogen
- Oxygen

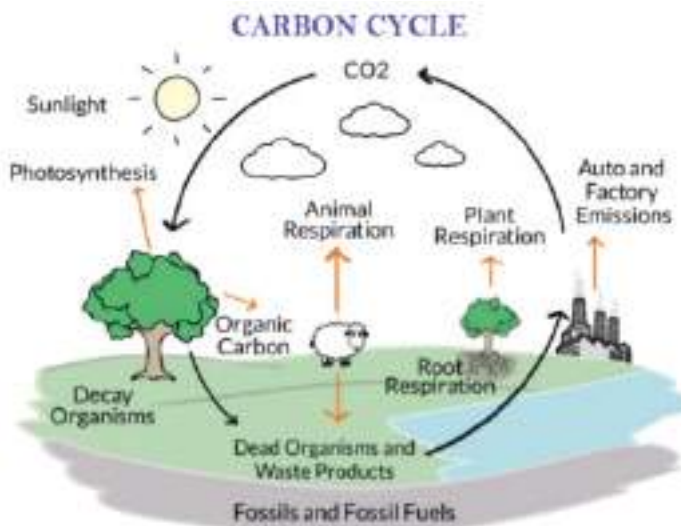
- Carbon dioxide
- Rare gases (Argon, Neon, Xenon and others)
- Water vapour
- Dust particles

Carbon and nitrogen are cycled in nature. This can be demonstrated for you to understand. Carbon and oxygen are elements. When these elements combine chemically, they can either form carbon monoxide (CO) or carbon dioxide (CO<sub>2</sub>). When one carbon atom combines with one oxygen atom, it forms carbon monoxide which is a poisonous gas. When one carbon atom combines with two oxygen atoms it forms carbon dioxide.

When you breathe in air, oxygen in the air enters your body. When you breathe out air, carbon dioxide produced in the body comes out. When all animals breathe out, carbon dioxide comes out and is released into the atmosphere. All internal combustion engines release carbon dioxide into the atmosphere. Factories also release carbon dioxide into the atmosphere. Bush fires also produce carbon dioxide. Plants take carbon dioxide to help them make their own food in a process called photosynthesis.

Though carbon dioxide is useful to plants which benefit animals including humans, too much of it in the atmosphere causes harm. It causes global warming. Global warming causes the ice in the Polar Regions to melt. When the ice melts, it causes flooding of low-lying coastal areas. When the quantity of carbon dioxide is too high, it can also cause difficulty in breathing, sweating and increased heartbeat.

It is not only plants that use carbon dioxide to make their food which also benefits animals including humans. Human beings also use carbon dioxide in ways which include making fire extinguishers and fizzy drinks.



### Summary

- Carbon dioxide is a gas which is a key component of air
- Carbon dioxide helps plants to make their own food, it also helps to keep the world warm. It is used for making fire extinguishers and fizzy drinks
- Too much carbon dioxide in the atmosphere results in global warming which makes the earth too warm leading to floods and droughts.

### Diagnostic Assessment

1. Write down two processes each that
  - (a) Produce carbon dioxide
  - (b) Uses carbon dioxide

### Answers to Diagnostic Assessment

- (a) Respiration
- (b) Burning(combustion) of fossil fuel

### Progressive Assessment

Name two places that plants get carbon dioxide from

### Answers to Progressive Assessment

Respiration of plants and animals  
Burning of fossil fuels

### Answers to Study Questions (Refer to LB page 69)

1. It is used by plants to manufacture their own food through photosynthesis. It is also used to make fire extinguishers and fizzy drinks
2. By planting more trees. Stop burning bush and too much fossil fuel
3. i) When the quantity of carbon dioxide is too high, it can also cause difficulty in breathing and sweating. It also increases heartbeat.  
ii. It causes global warming which causes the ice in the Polar Regions to melt. It also causes droughts in some parts of the world when the temperatures are too high.
4. Write any two work places that require carbon dioxide in their daily work
5. Say whether the following statements about carbon dioxide are true or false
  - i. False
  - ii. True
  - iii. False
  - iv. False
  - v. True
6. Carbon dioxide gas is a component of air. It has uses for humans and plants. It is required to produce food through the process of photosynthesis. However too much of this gas makes the earth warmer. We can reduce the amount of carbon dioxide in the earth by avoiding deforestation.

**Diagnostic assessment for facilitator**

1. Did you draw the attention of learners to a previous knowledge?
2. Did you disclose learning expectations with learners?
3. Did your pedagogy enable you to deliver the lesson successfully?
4. Did you present the lesson in order
5. Did you refer learners to exercises in the workbook and the learners book?

## **STRAND 2: CYCLES**

### **SUB-STRAND 1: EARTH SCIENCE**

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#### **LESSON 11: HOW WATER GETS POLLUTED**

**Reference: Learner's Book pages 70 - 78**

#### **Expected Learning Outcomes**

- Identify the causes of water pollution
- Evaluate the causes of water pollution in the community
- Explain how water pollution can be controlled or prevented

**Content Standards:** B5.2.1.5 Recognise water and air as important natural resources

**Indicators:** B5.2.1.5.1 Identify human activities that make water unsuitable for human use

**Core Competencies:** Critical Thinking and Problem-Solving, Cultural Identity and Global Citizenship, Personal development and leadership, Communication and Collaboration, Creativity and Innovation

**Subject Specific Practices:** Analysing, Predicting, Analysing, Evaluating, Communicating

#### **Introduction**

Purity of water is an issue of great concern. Human beings desire to always drink clean water. The same human beings who want clean water to drink also engage themselves in activities that make it impure. There are human activities that can make water impure. There is the need to identify such activities to avoid them.

**Key Words:** Pollution, sewage, pesticides

#### **Additional Information**

Water is a very important natural resource. Humans and other living things use water for many things. You drink water every day. It is not all water that is potable (drinkable). There are certain qualities that water must have before you can drink it so that you do not have any problem. If you drink water which does not have these qualities you are likely to fall sick.

Qualities of good drinking water are:

- It must be tasteless
- It must be odourless ( it should not smell)
- It must not have particles in it.
- It must not have any colour

When you use unsafe water, you will expose yourself to certain dangers. Drinking unclean water can make you contract water-borne diseases such as cholera and typhoid. There are human



activities that make water unsafe for use. These activities include toxic waste disposal, sewage disposal, deforestation, mining, littering, pesticides, herbicides and fertilizer application and agricultural practices.

Most often water becomes impure through the following human activities:

**Toxic waste disposal (Industrial waste dumped into water):** Some industries (factories) also produce waste substances which are discharged into water bodies. For example textile industries discharge dyes and other chemical into water bodies close to them. These waste substances may be toxic and are harmful to humans when they find their way into water bodies.



**Sewage disposal:** Untreated sewage discharged into water bodies results in the outbreak of diseases such as cholera and typhoid.



**Improper disposal of animal wastes:** Animal wastes from people who rear animals also dispose of the waste of those animals in an improper manner which finally ends up into water bodies. Examples are piggeries, poultry farms and cattle ranches.



**Mining:** In order to get the fine metal out from the sand, chemicals are added which are washed into rivers and other water bodies.



**Littering:** People throw rubbish into their surroundings and gutters. When rain falls they are washed into rivers and water bodies. Some people throw the rubbish directly into the rivers and other water bodies which makes the water impure. We must learn to avoid these things.



**Pesticides application:** Farmers apply pesticides to their crops to kill pests which destroys crops. The pesticides are washed into surrounding water bodies during rainfall.



**Fertilizer application:** Farmers also apply fertilizers to the soil in their farms to provide nutrients to the crops to make them grow well to increase their yield. These fertilizers are washed into surrounding water bodies during rainfall.



**House hold chemicals:** Some chemical are used in our homes. Some of these chemicals include shampoos, liquid soap, mosquito spray and many others. These chemical flow into gutters and finally end up in water bodies.



What do you think will happen to you if you drink impure water?.



*Photo Credit: Muntaka Chasant/Agboglobshie, Ghana*

## How to control water from being made unclean

Industries (factories) produce waste substances which are discharged into water bodies should not be allowed to do so.

Untreated sewage should not be discharged into water bodies.

Animal wastes from people who rear animals should not be allowed to dispose of the waste of those animals into or near water bodies.

Mining companies should not be allowed to dump the chemicals they use into water bodies.

People who throw rubbish into their surroundings and gutters should be punished.

Some of these chemicals including shampoos, liquid soap, mosquito spray and many others should be disposed of properly.

Farmers should be educated to apply organic fertilizers only to the soil in their farms.

Farmers apply pesticides to their crops to kill pests which destroys crops should be educated to use another means to control these pests.

*Project: Task learners to work in groups to create concept maps on the causes, control and prevention of water pollution.*

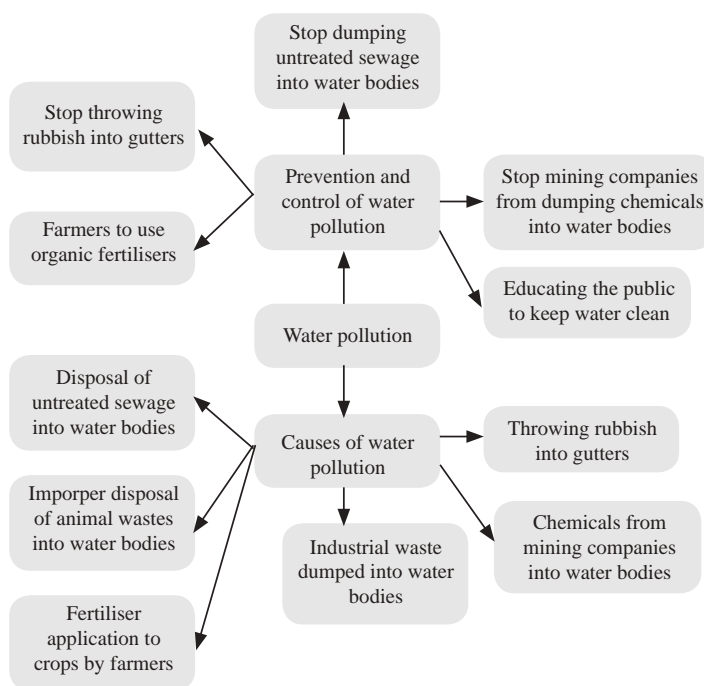


Figure 2.1.5.1 Concept maps on the causes, control and prevention of water pollution.

## Summary

- Good drinking water must be tasteless, odourless (it should not smell), have no particles in it, and must not have any colour.
- Drinking unclean water can make you contract water-borne diseases such as cholera and typhoid.
- There are human activities that make water unsafe for use.
- These activities include toxic waste disposal, sewage disposal, deforestation, mining, littering, pesticides, herbicides and fertilizer application and agricultural practices.

## Diagnostic Assessment

Water should have certain qualities before it can be describe suitable for drinking. Write down two qualities of water suitable for drinking

Name two activities in a village that can make water unclean five activities of people in your community that can make water unclean.

## Answers to Diagnostic Assessment

1. It must be tasteless  
It must be odourless ( it should not smell)  
It must not have particles in it.  
It must not have any colour **(Any 2)**
2. Improper disposal of animal waste  
Littering, pesticide and fertilizer application, discharge of household chemicals into gutters, (Any 2

## Progressive Assessment

Name two substances which can make water impure and where their sources

## Answers to Progressive Assessment

Fertilizers: From farms

Pesticides: From farms

Shampoo: from houses

Animal waste: From poultry, piggeries and other animal rearing places

Any 2

## Answers to Study Questions (Refer to LB page 78)

1.
  - It is tasteless
  - It is odourless ( it does not smell)
  - It does not have particles in it.
  - It does not have any colour

2.
  - It may have some taste
  - It may have some odourless
  - It may have particles in it.
  - It may have some colour
3. A
  - Discharging untreated sewage into water bodies
  - Disposing of animal wastes from people who rear animals in an improper manner which finally end up into water bodies.
  - Throwing of rubbish into surroundings and gutters. This rubbish is washed into rivers and water bodies.
  - Applying pesticides, by farmers, to their crops. These pesticides are washed into surrounding water bodies during rainfall.
  - Fertilizers applied by farmers to crops are washed into surrounding water bodies during rainfall.
- B.
  - Untreated sewage should not be discharged into any water body.
  - Animal wastes from people who rear animals should not be allowed to dispose of the waste of those animals into or near water bodies.
  - People who throw rubbish into their surroundings and gutters should be punished.
  - Some chemicals including shampoos, liquid soap, mosquito spray and many others should be disposed of properly.
  - Farmers should be educated to apply organic fertilizers only to the soil in their farms.
4.
  - i. Humans: It can lead to outbreak of cholera, typhoid and other water-borne diseases.
  - ii. Animals: Animals drink water from polluted water bodies can fall sick and die
  - iii. Plants: Plants that live in water can die
  - iv. Fish: Fishes can be poisoned and they will die

### **Diagnostic assessment for facilitator**

1. Did every learner show interest in the lesson?
2. Did the learners ask you questions about the lesson?
3. Was the presentation of your lesson disability friendly?
4. Did you discuss home learning assignment with the learners?

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**STRAND 2: CYCLES**  
**SUB-STRAND 1: EARTH SCIENCE**

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**LESSON 12: KEEPING THE AIR CLEAN**

**Reference: Learner's Book pages 79 - 86**

**Expected Learning Outcomes**

- Identify the causes of air pollution
- Know how air pollution can be prevented

**Content Standards:** B5.2.1.5 Recognise water and air as important natural resources

**Indicators:** B5.2.1.5.2 Know how to make and keep air clean in our environment

**Core Competencies:** Critical Thinking and Problem-Solving, Cultural Identity and Global Citizenship, Personal development and leadership, Communication and Collaboration, Creativity and Innovation

**Subject Specific Practices:** Analysing, Predicting, Analysing, Evaluating, Communicating

**Introduction**

The three most important things to humans are air, water and food. Humans and other living organisms are surrounded by air. Can air become unclean? What are some of the things that can make air unclean? Smoke from factories, car exhausts, bush burning and dust from construction sites and untarred roads can make air unclean. There are several human activities that cause pollution of air.

**Key Words:** exhaust, polluted, odourless

**Additional Information**

We breathe in air everyday. Living things can only stop breathing when they are no longer alive. Since the air we breathe come from our environment, it is important to keep it clean so that the air we breathe in can also be clean.

Water and air are important natural resources. Humans and other living organisms are surrounded by air. Smoke from factories, car exhausts, bush burning and dust from construction sites and untarred roads can make air unclean. There are several human activities that cause pollution of air. They are as follow:

1. Smoke, soot, carbon dioxide and other harmful substances are released from furnaces in factories into the air.

2. Burning of fuel sends large volume of carbon dioxide to the atmosphere. Vehicles releases carbon dioxide and water vapour into the air when there is complete burning of fuel. Soot, carbon monoxide oxide and water vapour are released when there is incomplete burning of fuel.
3. Carbon dioxide is released into the air through burning of bush. Bushes are burnt through farming activities and hunting of wild animals (bush meat).
4. Cigarette smoking produces smoke, carbon dioxide, nicotine and tar into the air.
5. Mining activities, quarry, road construction, and other industrial activity release dust, soot and fine particles of some heavy metals into the air.
6. Aerosol spray insecticide, deodorants, and perfumes released into the atmosphere also make air unclean
7. When dead plants and animals are rotten they release carbon dioxide into the atmosphere.
8. Hamattan wind sends large quantities of dust into the atmosphere.

### **Things that can make air clean**

Is it possible that air can be made clean when it is made unclean? What are some of the things you can do to make air clean. There are some things you can do to make air clean in your home and surrounding environment. These are some of the things you can consider.

Keep windows opened

Plant trees in your environment

Use air purifier

Keep surrounding neat

Sweep your compound regularly

Avoid burning rubbish and old vehicle tyres close to your home

Educate people on the need to keep air clean

Stop smoking in public

Vehicles with old and weak engines which smoke badly must not be allowed on the roads.

Stop uncontrolled bush fires

### **Starting the lesson**

Find out from learners what they understand by clean air and review things that pollute air (make air unclean) such as smoke from factories, car exhausts, bush burning and dust from construction sites and untarred roads.

Lead learners in a discussion to come out with the do's and don'ts that will make or keep air clean in our homes and surrounding environment (planting of trees and grass and avoiding frequent and uncontrolled burning).

Explain to learners what a concept map is.

Instructs learners to design a concept map on the causes, prevention and control of air pollution.

Explain to learners what a future's wheel is and then tells learners in groups of four or five to draw and use a Future's Wheel to trace the effects of water pollution on the environment.



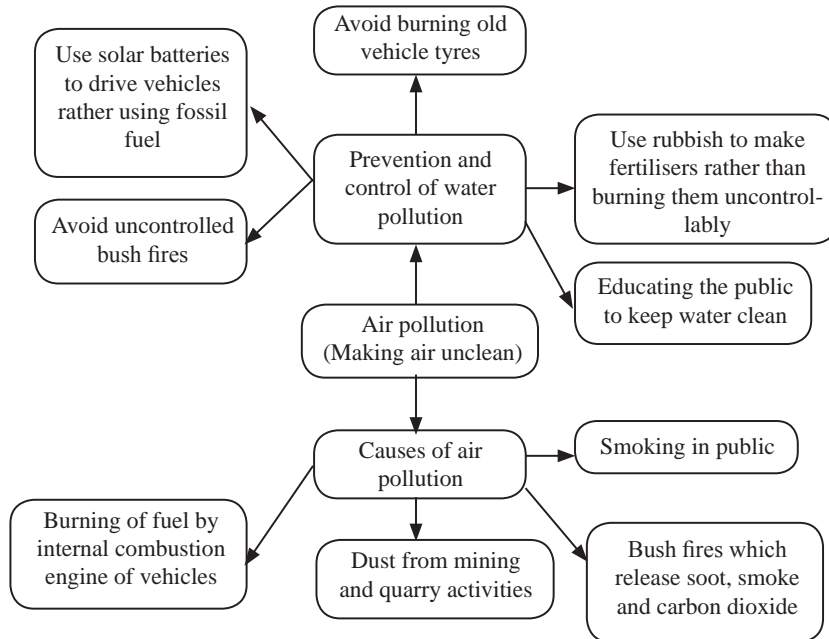


Figure 2.1.5.2(b): Concept map on causes, prevention and control of air pollution

You can also draw and use a Future’s Wheel to trace the effects of water pollution on the environment. Use the example given you in figure 2.1.5.2(b)

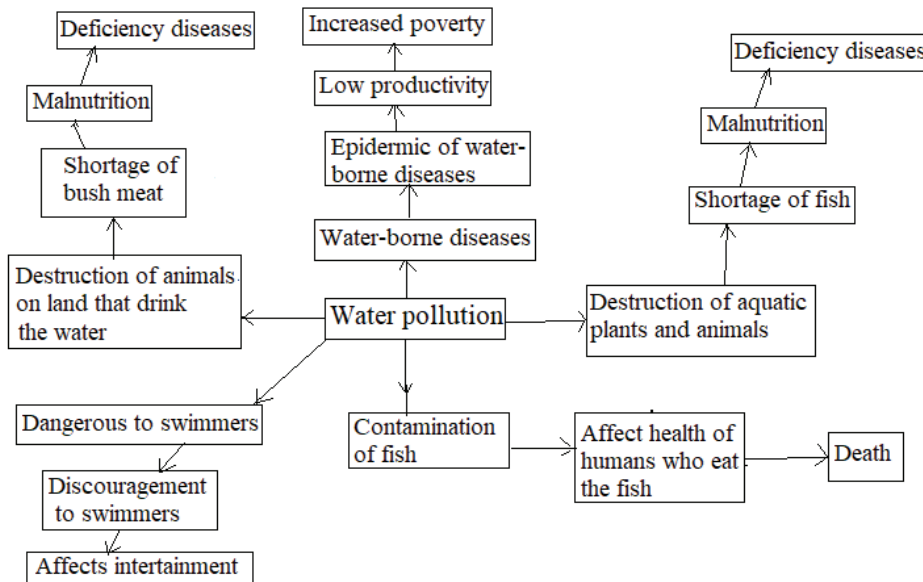


Figure 2.1.5.2(a): Future’s wheel to trace the effects of water pollution on the environment

### **Summary**

Air can become unclean. Smoke from factories, car exhausts, bush burning and dust from construction sites and untarred roads can make air unclean. There are some things you can do to make air clean.

### **Diagnostic Assessment**

1. What is unclean air?
2. List two substances that can make air unclean

### **Answers to Diagnostic Assessment**

1. Unclean air is air that contains substances which not good to breathe in which can affect the health of human being and other animals.
2. Smoke, aerosol spray, insecticide and dust from untarred roads (any 2).

### **Progressive Assessment**

1. Write down two activities that are carried out in homes that can make air unclean?
2. How can activities in homes that make air unclean be prevented?

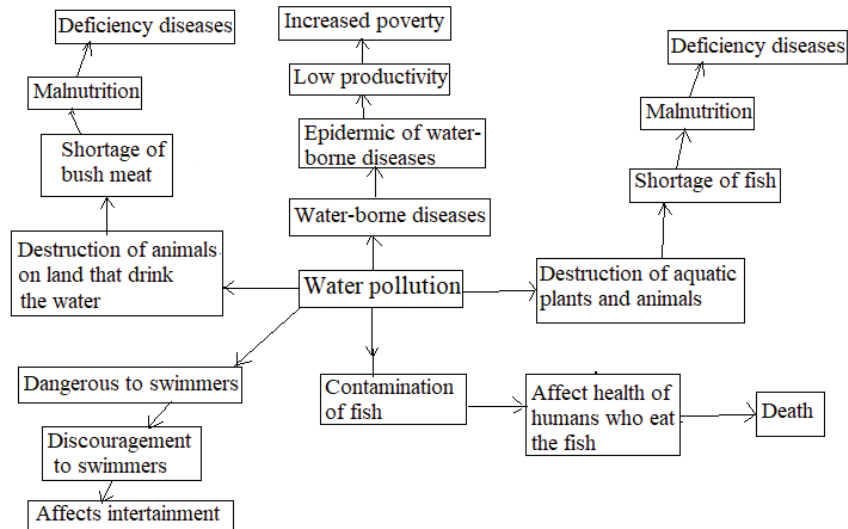
### **Answers to Progressive Assessment**

1. Smoking fish, smoking cigarette, burning mosquito coil, using insecticide spray (any 2)
2. Fish smoking must be regulated and a more appropriate method used, public smoking of cigarette must be banned, Mosquito coils that produces smoke must be banned. Instead insecticide mosquito net must be used. Recommended insecticide spray only must be used

### **Answers Study Questions (Refer to LB page 86)**

1. carbon dioxide together with soot, aerosol spray insecticide and dust from untarred roads.
  2. Write down four human activities that makes air unclean
    - Burning of fuel sends large volume of carbon dioxide together with soot sometimes and even carbon monoxide when there is incomplete combustion.
    - Burning of bush by farmers and hunters which releases carbon dioxide into the air.
    - The use of aerosol spray insecticide, deodorants, and perfumes releases these substances into the atmosphere make air unclean
  3. Suggest three ways to keep air clean in your community
    - Keep windows opened
    - Plant trees in your environment
    - Keep surrounding neat
    - Sweep your compound regularly
    - Avoid burning rubbish and old vehicle tyres close to your home
    - Educate people on the need to keep air clean
    - Stop smoking in public
    - Stop uncontrolled bush fires
- Any 3

4. The leaders of the community should
  - stop people from dumping more rubbish at the site.
  - provide dust bin at vantage point.
  - organise the people to do communal labour to dispose of the refuse at a proper place.
5. Draw Future's wheel to trace the effects of water pollution on the environment



### Diagnostic assessment for facilitator

1. Was there any hands-on activity?
2. What core competences can you identify being developed in the learners?
3. What was the reaction of the learners with respect to environmental cleanliness?

## STRAND 2: CYCLES

### SUB-STRAND 2: LIFE CYCLES OF ORGANISMS

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#### LESSON 13: FUNCTIONS OF THE PARTS OF A PLANT

**Reference:** Learner's Book pages 87 -

#### **Expected Learning Outcomes**

- Know the names of the various parts of a plant
- Explain the functions of each part of the plant

**Content Standards:** B5.2.2.1 Demonstrate understanding of life cycle of a plant

**Indicators:** B5.2.2.1.1. Relate structure of the parts of a plant (leaves, stem, root flower) to the functions they perform.

**Core Competencies:** Critical Thinking and Problem-Solving, Cultural Identity and Global Citizenship, Personal development and leadership Communication and Collaboration, Creativity and Innovation

**Subject Specific Practices:** Analysing, Predicting, Analysing, Evaluating, Communicating

#### **Introduction**

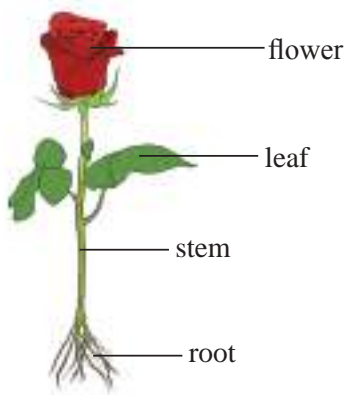
We have all seen plants before. We see them daily in our homes, schools and communities. Just as human beings have different parts, plants also have different parts, which perform different functions for the plant to grow and develop well.

**Key Words:** Manufacture

#### **Additional Information**

Just like human beings like you, have different parts, plants also have different parts which perform different functions for the plant to grow and develop well. The parts of the plant include leaves, stem, roots and flowers. These parts have specific structures which enable them to perform the functions that they perform.

Plants grow on our farms, around our homes, school and along the roads. Cocoyam, plantain, mango, pawpaw, orange and pepper are all familiar plants. They are also made up of the following parts: leave, stem, and roots. Flowers, fruits and seeds are also developed by same plants.



### Structure and Functions of the parts of a plant.

**Roots** – it holds the plant firmly in the soil.

- it absorbs water and mineral salts for the plants. Some roots store food substances. Cassava is a root tuber which stores starch.

**Stem** – A stem lie between the root of the plant and the leaves, flowers and fruits. Some stems are thin and slender. Examples such stems are creeping plants and climbing plants. They are not able to hold their fruits up, Example is water melon. Some stems are strong. They are able to hold big fruits up without breaking. It holds the leaves. The stem has branches, leaves, nodes and internode.

Some stems can be found underground. An example is ginger. Some stems contain green pigment and appear green. They are able to make food for the plant. The stem also transports water and mineral salts to the leaves. Yam is a stem tuber. It stores starch.

**Leaves** – Most leaves are thin, flat and have broad surface area which it exposed to the sun to absorb sunlight. They have leaf blade, leaf stalk and the leaf base where it is attached to the stem of the plant. They also have green pigments called chlorophyll which absorb sunlight. The sunlight is used to manufacture food for the plant. The leaves also have veins to transport water and food substances they manufacture to other parts of the plant. Some leaves also store food for the plant. Onion is referred to as a bulb. It stores food in its leaves.

**Flowers** – Most flowers of plants have male and female parts which produce male and female gametes respectively. The male part is called stamen which has anther and filament. The female part has ovary style and stigma. The anther of the male part produces pollen grains which contain the male gamete. The ovary of the female part produces the female gamete. The male gamete and the female gametes fuse together to form zygote which develops to for the seed. The ovary develops to form the fruits.

### Starting the lesson

- Discuss functions of parts of plants with learners.
- Learners go on a nature walk to uproot young plants from school surroundings and bring them to class.
- Learners in a group, observe parts of the plants and rotate them to the functions they perform, e.g. Thin and large surface area of leaves and the presence of green coloring matter enhance their work. The roots are for anchorage and absorption of nutrients from the soil. The stem supports the upper part of the plant: conduct water and minerals from the roots to the leaves; carry food from leaves to other parts of the plant.
- Learners draw and colour a plant and label the parts.
- Discuss functions of parts of plants with the learners.
- In your groups, (five or four in a group) go on a nature walk and uproot young plants from school surroundings and bring them to class.
- In your groups, observe parts of the plants and relate them to the functions they perform, e.g. the thin and large surface area of leaves and the presence of colouring matter enhance their work. The roots are for anchorage and absorption of nutrients from the soil. The stem supports the upper part of the plant; conduct water and minerals from the roots to the leaves; carry food from leaves to other parts of the plant.
- Draw and colour a plant and label the parts.

### Summary

- Just like human beings like you, have different parts, plants also have different parts which perform different functions for the plant to grow and develop well.
- Plants have root, stem, leaves, and flowers.

### Diagnostic assessment questions.

1. Plants have four main parts: False/True
2. Write down the four main parts of a plant.
3. Write down the functions of the root of a plant.

### Progressive Assessment Questions

1. Give one example of a plant which store food in its
  - i. leaf
  - ii. root
  - iii. stem

### Answers to diagnostic assessment questions

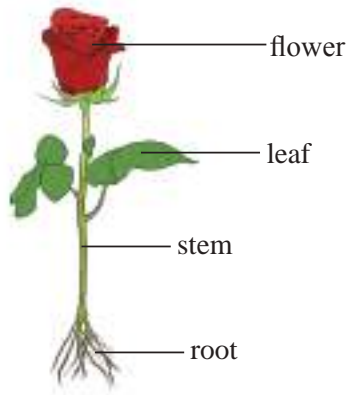
True – Plant have four main parts. The parts are (i) leaves (ii) stem (iii) root (iv) flower  
The roots are for anchorage and absorption of nutrient from the soil.

### Answers to Progressive assessment questions

(i) Onion (ii) Cassava (iii) Yam

**Answers to Study Questions (Refer to LB page 91)**

1. Root: Absorbs water and mineral salts  
Stem: Holds the fruits, leaves and flowers up  
Leaves: Manufacture food for the plant  
Flower: Produces fruits and seeds
2. Complete each of the following statements with the best option
  - i. C. leaves.
  - ii. D. Flowers
  - iii. A. Insects
  - iv. D. Nutrients
- 3.



**Diagnostic assessment for facilitator**

1. What did you do to make the learners appreciate the relevance of studying this topic?
2. What do you think the presentation of this lesson can contribute to the national economy?
3. Did you use assessment for learning strategies well during the lesson?

## **STRAND 2: CYCLES**

### **SUB-STRAND 2: LIFE CYCLES OF ORGANISMS**

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#### **LESSON 14: GERMINATION OF SEEDS**

**Reference: Learner's Book pages 92 - 95**

#### **Expected Learning Outcomes**

- Compare germination of bean seed with maize

**Content Standards:** B5.2.2.1 Demonstrate understanding of life cycle of a plant

**Indicators:** B.5.2.2.1.2. Compare the differences in germination of bean and maize seeds.

**Core Competencies:** Personal Development and leadership, Communication and Collaboration, Critical Thinking and Problem-Solving

**Subject Specific Practices:** Observing, Manipulating, Analysing, Classifying, Generalising

#### **Introduction**

We have learnt that germination of a seed will take place when conditions are right. The conditions apply to all type of seeds. The conditions include:

- i. Viable seed (the seed must mature)
- ii. Favourable conditions (air, water or moisture)
- iii. Suitable temperature

In this learning, you need to work with your friends to plant different seeds. You must observe the seedlings carefully and identify the differences between them.

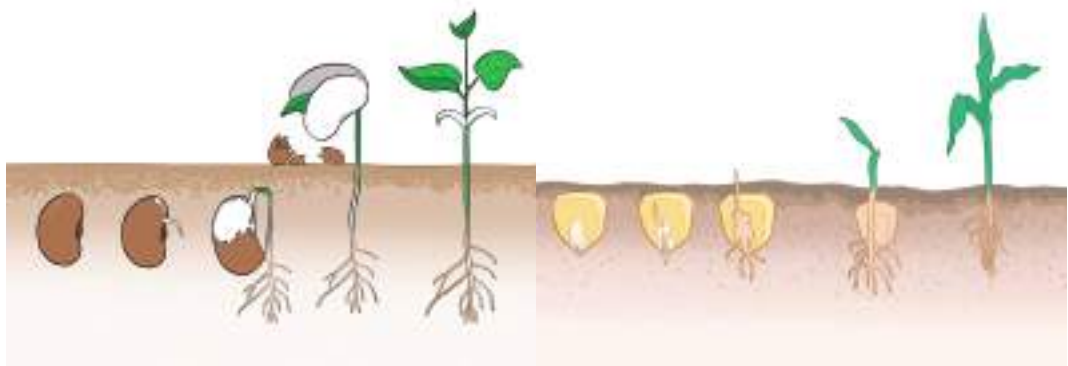
**Key Words:** cotyledon(seed leaf), germinate

#### **Additional Information**

We have learnt that germination of a seed will take place when conditions are right. The conditions apply to all type of seeds. The conditions include:

- i. Viable seed (the seed must mature)
- ii. Favourable conditions (air, water or moisture)
- iii. Suitable temperature





### Activity

1. In their groups let learners examine and discuss the diagrams they have seen above. Let them examine the following stages of germination well:
  - i. radicle grows down
  - ii. plumule comes above ground
  - iii. testa (seed coat) is discarded.
  - iv. cotyledons come out.
2. Germination of grain - maize bud protected by coleoptile. New leaves emerge above the coleoptiles

### Activity 2.2.2.1.2: Stages of seed germination

**Materials/Resources (Low or no cost):** Beans seeds, maize seeds, soil and transparent container

#### Procedure

In their groups give dry beans and maize seeds to learners. Help learners to collect transparent containers and soil. Plant the seeds in the transparent containers.

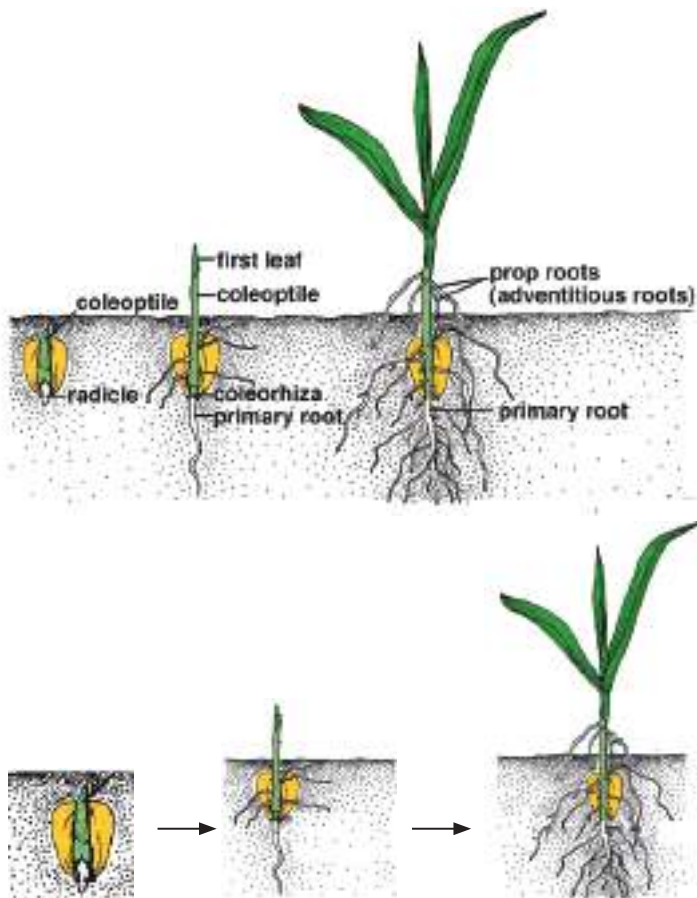
Guide learners to:

1. observe and take note of the dry seed.
2. observe when seed absorbs water and swells.
3. observe the rupturing of the seed coat.
4. observe sprouting of the roots
5. observe sprouting of the stem and seed leaves
6. observe the elongation of the root and stem

Observe and find out where the seed leaves (cotyledons) remain, inside the soil or above the soil.

Guide the learners to find a suitable place to put their experiment (germination of bean and maize seeds).

This activity will take some days to complete. Ask learners to write notes on whatever they observe.



### Summary

Germination of a seed will take place when conditions are right. The conditions for germination of seed are viability of seed (the seed must mature), air, water or moisture and suitable temperature

### Diagnostic Assessment

1. What happens to the cotyledon of the following seeds during germination?:
  - i. maize
  - ii. beans

### Progressive Assessment

1. Mention one seed which germinate like beans
2. Mention one seed which can also germinate like maize

### Answers to Diagnostic Assessment

- i. It remains in the soil
- ii. It comes out of the soil

### Answers to Progressive Assessment

1. Groundnut, cocoa, mango (any other correct seed)
2. Rice, wheat, millet (any other correct seed)

### Answers to Study Questions (Refer to LB page 95 )

1. Temperature, water, air, viability of the seed
2. When conditions are right the seed starts to take in water.
  - i. The shoot develops and reaches toward the light while the root system develops deep in the soil.
  - ii. Air can then get to the seed. So, the oxygen in the air helps the baby plant get energy and food
  - iii. As water is taken in, the seed swells bigger and bigger until the coat splits apart.
  - iv. The **cotyledons** become the first leaves of the seedling when the seed germinates.
  - v. As a result, the baby plant uses the energy to grow.
  - vi. A tiny root grows downwards whereas a shoot begins to grow upwards.
3. Germination is the process through which **seeds** mature into baby plants called **seedling**. There are **two** types of germination. Before a seed germinates conditions such as **temperature** and **water** must be provided.
4. The cotyledon (seed leaf) of bean seed comes out above the soil but the cotyledon of maize remains inside the soil and does not come out during germination.

### Diagnostic assessment for facilitator

1. Were you able to relate the lesson to crop production in the country?
2. What aspect of your lesson engaged the learners in critical thinking?
3. What did you do to make sure that the learners display creative skills?

## STRAND 3: SYSTEMS

### SUB-STRAND 1: THE HUMAN BODY SYSTEM

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#### LESSON 15: THE RESPIRATORY SYSTEM OF HUMANS

**Reference:** Learner's Book pages 97 - 100

#### **Expected Learning Outcomes**

- Explain the function of the respiratory system
- Know the parts of the respiratory system

**Content Standards:** B5.3.1.1 Recognise that different parts of the human body work interdependently to perform a specific function

**Indicators:** B.5.3.1.1.1. Know the parts of the respiratory system in humans

**Core Competencies:** Digital Literacy, Personal development and leadership, Communication and Collaboration, Critical Thinking and Problem-Solving, Creativity and Innovation

**Subject Specific Practices:** Observing, Analysing, Classifying, Communicating, Designing, Interpreting

#### **Introduction**

You are able to hear, see smell, walk, think and do many other activities. There are certain part of the body that make you do these activities. All these parts work together.

A living thing which is able to exist on its own is called an organism. All organisms need air to breathe. They need a system which will make sure that all the living cells in their body get air. A system called respiratory system is therefore a structural part of the whole organism to achieve this purpose.

**Key Words:** Trachea, pharynx

#### **Additional Information**

All organisms are made up of cells (the basic unit of life which carry out the important chemical processes. The simplest orgasms have just one cell. They are unicellular or cellular but very complex ones. For example, human have many billions of cells, they are multicellular and their cells are of many different types. Each type is specially adapted for its own particular function. Groups of cells of the same type (together with non-living materials) make up the different tissue of organism for example muscle tissue. Several different types of tissue together form an organ. For example, the stomach, and a number of organs together form a system known as the digestive system. The respiratory system too consists of cells, tissues and organs.

### Poem /Rhyme

*I am human being  
I have a head, neck and two hands  
I am human being.  
I have a chest, abdomen and two ears.  
I am a human being  
I have a mouth, a nose, two eyes and two legs  
These are the parts of my body.  
My abdomen contains my stomach. I cannot see it.*

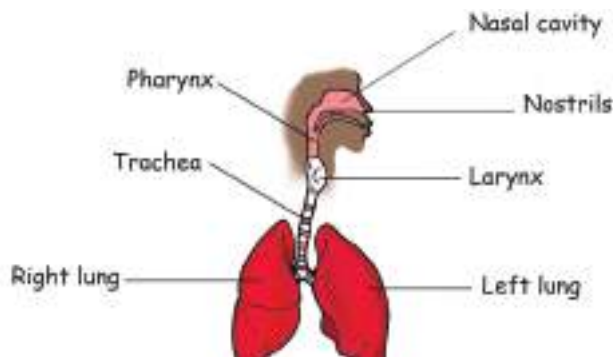
The term respiration covers three processes – (a) breathing: this is taking in oxygen and expelling carbon dioxide. (b) the exchange of gases between the lungs and the blood. (c) food breakdown using oxygen and producing carbon dioxide.

The respiratory system includes:

**Trachea or windpipe** - that is the main tube through which air passes on its way to and from the lungs,

**Larynx** – the voice box at the top of the trachea

**Lungs** - the two main breathing organs inside which gases are exchanged.



### Starting the lesson

- Introduce the lesson with songs on the parts of the body, for example Head, shoulders, knee and my toes.
- Ask learners to breath in and out for some time.
- Guide learners and relate the act of breathing to the respiratory system and guides them to identify the organs of the system using charts or models.
- Show to learners other charts and models of the respiratory system in the charts and models of the system and asks them to mention the functions of the parts as he or she points at them.
- Guide learners, in their groups, to role play the functions of each part of the respiratory system. Example, one member of the group, Ama is the lungs. Ama will mention lungs and describe the function the lungs play in the system. Amina who is also a member of a group is the diaphragm and describe the function the diaphragm plays in the system.

### Activity 3.1.1.1.: Designing the breathing model

**Materials/Resources (Low or no cost):** plastics bags, balloons, rubber bands and polythene bags.

#### Procedure

- Guide learners to design a breathing model using plastics bags, balloons, rubber bands and polythene bags.
- Tell learners to draw and label the respiratory system in their exercise books, and state its function.
- Lead learners, in their groups, to go out into the community and find out the diseases and lifestyles that affect the respiratory system adversely.

**Project:** *Designing an improvised breathing apparatus using plastics.*

*Give a project to learners, in their groups of four or five, to design an improvised breathing apparatus using plastics.*

#### Summary

- The respiratory system is responsible for breathing and the exchange of gases between the lungs and the blood.
- It also helps to breakdown food using oxygen to release energy
- The respiratory system includes trachea or windpipe, larynx, lungs, bronchi and diaphragm.

#### Diagnostic assessment Questions

1. Explain briefly what unicellular and multicellular organisms are.
2. What is an organ?

#### Answers to diagnostic assessment questions

1. The simplest organisms have just one cell they are called unicellular organisms. Complex organism, e.g. Human beings have many billions of cells they are called multicellular.
2. Several different types of tissues together form an organ, e.g. Stomach.

#### Progressive assessment questions

1. Write down a four organs in the respiratory system.
2. Write down two example of organ system

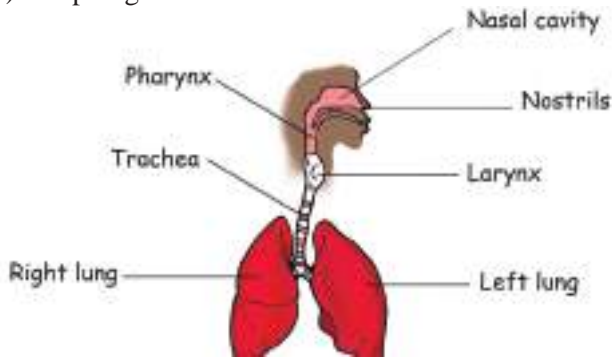
#### Answer to progressive assessment questions

1. (i) Nasal cavity; (ii)Nostrils, (iii) Larynx, (iv) Pharynx (v) Lung (left and right) (vi) Trachea (Any four)
2. Respiratory, (ii) Reproductive, (iii) circulatory, (iv) Nervous, (v)Skeletal

**Answers to Study Questions (Refer to LB page 100)**

1. a) They are parts of the respiratory system  
b) **Nose**-It has two openings through which air passes into and out of the body.  
**Trachea or windpipe** - this is the main tube through which air passes on its way to and from the lungs,  
**Larynx** – the voice box at the top of the trachea  
**Lungs**: Together the lungs form one of the body's largest organs. They're responsible for providing oxygen to capillaries and exhaling carbon dioxide.  
c) Nose, Larynx, Trachea or windpipe, Lungs
2. i) Trachea  
ii) Larynx  
iii) Lungs  
iv) Bronchi  
v) Diaphragm

3.



4. a) **Breathing**: this is taking in oxygen and expelling carbon dioxide.  
b) The exchange of gases between the lungs and the blood.  
c) **Food breakdown** using oxygen and producing carbon dioxide.

**Diagnostic assessment for facilitator**

1. How did you review the previous lesson with the learners?
2. Did you discuss diagnostic and progressive assessment meant for learners
3. Did you provide opportunity for each learners to carry out more hands-on to make use of resources
4. Were the learners curious to learn more about the respiratory system ?
5. Did you use assessment for learning strategies well during the lesson?

## **STRAND 3: SYSTEMS**

### **SUB-STRAND 2: THE SOLAR SYSTEM**

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#### **LESSON 16: THE PARTS OF THE SOLAR SYSTEM**

**Reference: Learner's Book pages 101 - 107**

#### **Expected Learning Outcomes**

- Know that the sun is the centre of the solar system
- Identify the other parts of the solar system including planets and satellites
- Link the relative position of the sun to the movement of planets
- Distinguish between satellites and planets

**Content Standard:** Show understanding of the orderliness of the sun, planets and satellites in the solar system, as well as the important role of the sun in the existence of the solar system.

**Indicator:** B5.3.2.1.1 Identify the components of the solar system (sun, earth, moon, other planets, satellites)

**Core Competencies:** Digital Literacy, Personal development and Leadership, Communication and Collaboration.

#### **Introduction**

We walk on the earth and plant our crops on it. The earth is a planet. During the day we see the sun in the sky. In the evening, we see the moon and the stars in the sky. The sun, moon, earth and other planets form the solar system. The sun is the centre of the solar system. The sun produces its own light. The planets including the earth do not produce their own light. The moon around the earth and other moons around the other planets are called satellites. These are natural satellites. They are smaller heavenly bodies that move round bigger heavenly bodies. The sun is fixed but the planets move round it. It is the sun that holds the planets around itself and the planets also hold the satellites around themselves. The stars are also luminous that is they produce their own light.

**Key Words:** Satellite

#### **Additional Information**

The sun is at the centre of our solar system. Other components include the planets with their moons. The moons are also called satellites. It is only the sun that produces its own light in our solar system. All the other components reflect the sun's light. The sun also holds all the planets in their individual orbits such that no component runs into another one. The earth on which we live is one out of eight planets that are known. The movement of the earth round the sun causes the seasons. There are two main seasons in our part of the world but four in other parts. A season



depends on the position of the earth in relation to the sun. In any particular season, atmospheric conditions remain relatively the same. When the earth moves away, the conditions change. The season also changes. It takes the earth one year to move round the sun. The cycle is then repeated.

**Materials/Resources (Low or no cost):** Charts, models or videos of the solar system  
The planet Venus.

### **Starting the lesson**

Procedure: Show learners a chart or a drawing or a video on the solar system.

Ask them to name the components one by one. Ask learners the component which is fixed and the ones that move. Ask them which of the components holds the others.

In answering these questions, the learners will appreciate the arrangement of the system.

They should note that the sun is fixed and holds the planets in orbit such that none crosses the other one.

The earth which is the planet on which life exists moves round the sun in  $365\frac{1}{4}$  days which is called one year. It is this movement that causes the seasons.

Lead learners to describe the seasons experienced in Ghana by asking them what pertains during the wet and dry seasons.

### **Activity 3.2.1.1 (a) Observation of the planet Venus**

- Tell learners to observe the sky just before sunset and report to the class the following day.
- Lead the learners to find out whether they saw the planet. Ask them to compare the brightness with the lights they see everyday.

### **Activity 3.2.1.1 (b) To role-play the sun and the planets in the solar system (whole class activity)**

- Lead learners to perform the activity in the school's playing grounds or football park.
- One learner stands in the middle to represent the sun. Orbits of different diameters are drawn round the sun as the focus.
- The learners representing the planets move around the sun in their orbits at different speeds.
- Lead class to describe satellites as small bodies orbiting bigger orbits. Satellites are called moons.
- Lead learners to understand that humans have constructed artificial satellites and placed them in orbits to serve different purposes such as transmitting of information and for military purposes.
- Ask learners to find out from their parents the folktales they heard about the solar system and report to class the following day.
- Teach learners the poem, I see the moon and the moon sees me.
- Lead learners to do the project by planning and designing to make a model of the solar system and report to the class the following day.

- They can use blu tac, clay, cardboard and wood. Look at their project work and advises them on what to do to complete the work.

### Summary

- The solar system is made up of the sun, planets and satellites.
- The sun is at the centre of the solar system and the planets move round it in their orbits.
- The sun is the source of all energy on earth.
- It helps in the formation of day and night and different seasons.
- Each of the eight planets move around the sun in their orbits.
- Satellites are heavenly bodies that move around planets.
- Our moon is a satellite of the earth.

### Assessment Questions

1. Diagnostic
  - i. What is the solar system?
  - ii. Name the planet on which life exists.
2. Progressive
  - i. Name the brightest object in the sky before sunset.
  - ii. Give two reasons why the sun is important to life on the earth.

### Answers to Assessment questions

1. Diagnostic
  - i. The solar system comprises the sun, planets and their satellites.
  - ii. The earth
2. Progressive
  - i. Venus
  - ii. The sun produces light and warmth to earth. Without these two there will be no life on earth.

### Answers to Study Questions (Refer to page 107)

1.
  - i. Sun
  - ii. Earth
  - iii. Moon
  - iv. Which structure represents a star?
  - v. what structure represents a planet?
2. Planets = Earth, Mercury, Jupiter, Saturn  
Star= sun  
Satellite= moon
3.
  - i. Satellite
  - ii. Sun
  - iii. Planets

iv. Satellite

v. Venus

4. Indicate whether each of the following statements about the solar system are true or false.

False

False

True

True

True

**Diagnostic assessment for facilitator**

1. Did you use any relevant previous knowledge to present this lesson?
2. What did you do to arouse the interest of the learners in the lesson?
3. Did any aspect of the lesson look abstract to the learners?
4. Did every learner benefit from the lesson?

## STRAND 3: SYSTEMS

### SUB- STRAND 3: ECOSYSTEM

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#### LESSON 17: ORGANISMS AND THEIR HABITATS

**Reference: Learner’s Book pages 108 - 120**

##### **Expected Learning Outcomes**

- Identify the different habitats of organisms
- Know the features of organisms in a given habitat
- Explain how certain features enable organisms to live successfully in their habitat

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

**Indicators:** B5.3.3.1.1 Know how various organisms are adapted to survive in their habitats

**Core Competencies:** Critical Thinking and Problem-Solving, Personal development and leadership, Communication and Collaboration

**Subject Specific Practices:** Analysing, Evaluating, Generalising, Designing, Interpreting

##### **Introduction**

We have already learnt that the natural home of a group of living things, or a single living thing, is called a habitat. We also learnt that the group of plants and animals found in one habitat is called a community. They all interact with each other and their environment.

The community of plants and animals in a given habitat, together with the non-living parts of the environment (example, air or water) is called ecosystem.

We should remember that the habitat is the natural home of a group of living things or a single living thing. Small habitats can be found within large habitats.

**Key Words:** Habitat, adapt, aquatic, terrestrial

##### **Additional Information**

Plants make their food from non-living matter by photosynthesis and are always the first member of a chain. This is because they have chloroplast in their leaves and to some extent in their stems. Chloroplast contains chlorophyll which absorbs sunlight which the plants use to make their food. This means that plants must live in places where there is light. Animals cannot make their own food and so rely on the food making activities of plants. This also means that

these animals must live at places where plants can be found. The place where living things live include land, air and water.

### **Starting the lesson**

Start the lesson by asking learners whether they can live in water. Ask learners to give reasons for the answer they will give.

Goes on to cite a bird as an example of living thing and asks learners where it lives and why it lives there.

Ask learners to explain why a bird cannot live in water.

Guide learners to discuss various habitats of animals and plants.

Guide learners to match flashcards with the organisms, with flashcards of habitats.

Guide learners to brainstorm and use their own language (vocabulary) to explain the term habitat.

Ask learners, in groups to give examples of animals that live in:

- i. water
- ii. Land
- iii. trees.

Assist learners to discuss how various organisms adapted to their habitat, for example, what enables fish to live in rivers, birds to live on trees?

### **Project: Designing a habitat.**

*Guide learners to plan, design and make a model of a habitat using card board, paper, blue tack and clay to show the homes of some animals.*

### **Summary**

- The habitat is the home of a given plant or animals.
- Animals and plants have special features or characteristics called adaptations that help them to live successfully in their habitat.
- The main examples of habitats are forests, grasslands, deserts, and aquatic habitats.

### **Diagnostic assessment questions**

1. What s habitat?
2. Write down the habitat of birds.

### **Answer to diagnostic assessment questions.**

1. The natural home of a group of livings or a single living thing.
2. Birds live on tress.

### **Progressive assessment questions**

1. Explain what enable fish to live in rivers.
2. Name two animals which can live on land and in water

**Answer to progressive assessment questions.**

1. Fish is able to live in rivers because it has fins and scales which enable it to swim in the rivers.
2. Frog and crocodile

**Answers to study Questions (Refer to page LB 119 - 120)**

1. i) Monkey, mahogany tree, squirrel, black bear and gorilla, bat, fox, neem tree(Any 2 or any other 2 correct organisms)  
ii) Tilapia, water lettuce, shark, salmon, frog, duck, lotus, and water lily, whale, dolphins, octopus, starfish, jellyfish and sea horses(Any 2 or any other 2 correct organisms)  
iii) Giraffe, grass cutter, mouse, deer, zebra, lion and elephant(Any 2 or any other 2 correct organisms)  
iv)Desert Habitat: Cactus, camel, gila monster, desert snakes and kangaroo rat(Any 2 or any other 2 correct organisms)
2. i) It has webbed digit to swim. It has streamlined body which allows it to swim fast by reducing resistance due to flowing water.  
ii) It has the capacity to store water and food. It can tolerate extremely hot temperature due to the stored water in its body, which helps in cooling.  
iii) It able to run very fast. This ability also protects them grassland fire. It has skin shades of brown that makes it hard to spot by predators among the dry, brown grass.
3.
  - The leaves are modified as spines to minimize water loss.
  - The stem is green, to make food for the plant.
  - The stem is swollen and fleshy to store water.
4. i. Forest  
ii. Aquatic  
iii. Grassland  
iv. Desert
5.
  - i. Because monkeys have thick furs, they can live successfully in water= False
  - ii. Plants in the grassland have shallow roots=True
  - iii. Both the lion and the zebra can be found in the grassland.=True
  - iv. Desert plants have stems that can store water=True
  - v. Because a dolphin is an aquatic animal, it can live successfully in a river=False
6. Elephant, ant, ostrich, antelope, tiger, zebra, lion, falcon

**Diagnostic assessment for facilitator**

1. Did you share learning expectations with learners?
2. Did you relate this lesson to humans and their environment?
3. What did you do to make sure that the learners display problem solving ability?
4. Did you create the atmosphere for the learners to discuss among themselves?
5. Which aspect of your lesson created opportunity analysis and evaluation for the learners

## STRAND 4: FORCES AND ENERGY

### SUB-STRAND 1: SOURCES AND FORMS OF ENERGY

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#### LESSON 18: ENERGY TRANSFORMATION

**Reference:** Learner's Book pages 122 - 132

#### Expected Learning Outcomes

- Identify different forms of energy
- Differentiate between different forms of energy
- Analyse the energy changes that take place in a body or object

**Content Standard:** Demonstrate understanding of the concept of energy, its various forms and sources and the ways in which it can be transformed and conserved.

**Indicator:** B5.4.1.1.1 Explain how energy is transformed from one form to another.

**Core Competencies:** Personal development and Leadership, Communication and Collaboration, Critical Thinking and Problem Solving.

**Subject Specific Practices:** Observing, Manipulating, Analysing, Evaluating, Classifying, Designing and Interpreting

#### Introduction

We have learnt that energy is the ability to do work. Anything that is capable of causing a body to do work has energy. We have also learnt that there are different forms of energy since there are different ways of making bodies to move when forces are applied to them.

In this lesson, we are going to learn about how energy can be changed from one form to another form.

**Key Words:** chemical energy, electrical energy

#### Additional Information

Energy is defined as the ability to do work. Anybody that can do work, that is, cause a force to be applied and the force cause another body to move some distance is said to possess energy. There are different forms of energy. Energy cannot be created nor destroyed but can be transformed from one form to another. This simply means that you can change energy from one form to another for example, from electrical to light as shown by an electric bulb. Whatever we do we cannot destroy energy. It can only be changed into another form.

The energy possessed by a body on top of a storey building is known as potential energy. When the body starts to fall, this energy is converted or transformed into kinetic energy. As the body touches the ground, the energy is transformed into sound energy and some heat energy. When the school bell is rang, we see the bob heating the metal bell. The movement of the bob is kinetic energy. As the bob rises above, it possesses potential energy. By hitting the metal bell we hear the sound. The energy does not get destroyed but is converted from one form into another.

**Materials/Resources (Low or no cost):** Flashlight, radio, television, bell, gong-gong drum.

**Starting the lesson**

Start lesson by asking learners to list different forms of energy they have learnt already. These include: potential, kinetic, electric, heat and light.

Listen as learners mention the forms of energy. Ask learners how the different forms of energy are manifested. Learners discuss how the different forms of energy are shown.

For example, light energy enables us to see and sound energy makes us hear.

**Activity 4.1.1.1 To demonstrate energy transformation.**

Ask learners to bring flashlight with two 1.5V cells with a light emitting diode to school. This is per group.

Direct learners on the activity. The cells are put into the flashlight with the light emitting diode. Learners switch on the flashlight and observe the light coming on. Ask learners to list the energy transformation that takes place.

Chemical (cells)     $\longrightarrow$     electrical (flashlight)     $\longrightarrow$     light (light emitting diode)

Ask learners to state other energy transformations for example, when a radio sounds. If the radio contains batteries, then it will be chemical to electrical and to sound. If it is connected to electric source, then it will be electrical to sound.

Listen as learners state the energy transformations that take place in the following activities, as they are performed by learners.

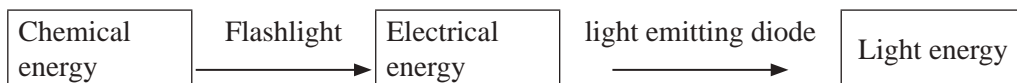
- When learners watch television as a whole class activity.
- When a gong-gong is being beaten.
- When a drum is beaten.

To show energy transformations using a flow chart.

A flow chart is a series of energy transformations drawn in rectangles and arrows showing the process which does the transformation.

For examples when a flashlight is used with a light emitting diode with batteries. The flow chart is shown below.





Study the flow chart and lead learners to draw their own flow charts to show energy transformations.

### Summary

- There are different forms of energy. They include heat, electrical, light and sound. Energy can be transformed from one form to the other. For example, chemical energy in a torchlight cell or battery is transformed into light energy in a bulb.
- In the school environment, there are several energy transformations. Similarly, energy transformations take place in our communities. For example, when a radio is turned on, chemical energy is transformed into electrical energy and then to sound energy. A flow chart shows how energy is transformed from one form to another.

### Assessment Questions

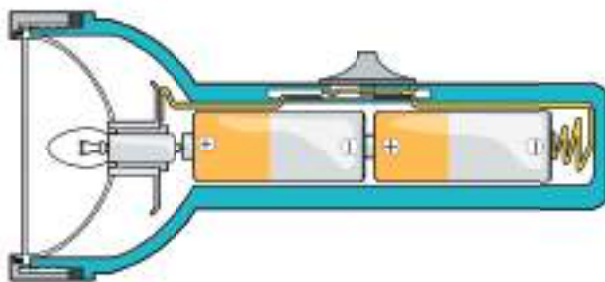
1. Diagnostic
  - i. Explain the term energy.
  - ii. List three types of energy.
2. Progressive
  - i. What is energy transformation?
  - ii. State the energy transformations that take place when the school bell is rang.

### Answers to assessment questions

1. Diagnostic
  - i. Energy is the ability to do work meaning the ability to make a force move its point of application through a distance in the direction of the force.
  - ii. Kinetic, potential, electrical, sound, heat, light, etc.
2. Progressive
  - i. Conversion of one form of energy into another form
  - ii. The mechanical energy (potential +kinetic) of the bob is converted into sound energy when it hits the bell.

### Answers to Study Questions (Refer to LB page 131 - 132)

1. i. Kinetic
  - ii. Heat
  - iii. Light
  - iv. Sound



2.
  - i. Chemical
  - ii. Chemical to electrical to light
  - iii. Light
3. Fill in the gaps the correct words in questions 4, 5 and 6. (sound, chemical, electrical, light, potential, kinetic). You may use an answer on more than one occasion.
  - i. The energy transformation that takes place when a radio set is switched on is **chemical** to **electrical** to **sound**.
  - ii. When a television is switched on the energy transformation that takes place is **electrical** to **light** and **sound**.
  - iii. When a drumming stick is raised up it has **potential** energy which is transformed to **kinetic** as it hits the drum and **sound** energy is produced.
4. Potential                      potential + kinetic                      kinetic                      sound + heat

**Diagnostic assessment for facilitator**

1. Did you observe how the learners communicate and collaborate among themselves when they were in groups?
2. Did you observe any of the learners showing some outstanding leadership skills?
3. Did you notice any special skills shown by the learners which can be improved upon?
4. How did you conclude the lesson?

## **STRAND 4: FORCES AND ENERGY**

### **SUB-STRAND 1: SOURCES AND FORMS OF ENERGY**

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#### **LESSON 19: USING ELECTRICITY EFFICIENTLY**

**Reference: Learner's Book pages 133 - 137**

#### **Expected Learning Outcomes**

- Mention some daily uses of electricity
- Identify activities that lead to wastage of electricity
- Explain how electricity wastage can be avoided in our homes and schools

**Content Standard:** B5. 4.1.1.1. Demonstrate understanding of the concept of energy, its various forms and sources and the ways in which it can be transformed and conserved.

**Indicator:** B5.4.1.1.2 Know how to use electricity efficiently in the home.

**Core Competencies:** Critical Thinking and Problem Solving, Cultural Identity and Global Citizenship, Personal development and Leadership, Communication and Collaboration.

**Subject Specific Practices:** Analysing, Evaluating, Manipulating

#### **Introduction**

In this modern day, electricity has become very important to all. It is very important as a source of energy. It has advantages over other sources of energy because it can be generated at one source and transported to where it will be used by cables. It is not bulky and thus can easily be transported to our homes, industry and offices.

Many of the appliances used in the home use electrical energy. Electrical energy is a clean form of energy and does not make our appliances dirty when we use them. Our fans, television sets, radios, pressing irons, all use electrical energy as their source of energy. Despite the listed advantages, electrical energy can be dangerous when not used with all carefulness.

**Key Words:** efficient, appliances

#### **Additional Information**

Although electricity is a clean source of energy and can easily be transported over long distances, it can cause a lot of harm to its user. It must therefore be used with utmost care. It is available most of the time but it is expensive. Its generation is by the transformation of various forms of energy into electrical energy. For example, in the hydro power generation, the potential energy of water in a dam is converted into electrical energy as the water falls. The height from which the water will fall is therefore very important. More water will increase the height at

which it will fall. However, more water depends on the amount of rainfall which humans cannot control. Today, thermal plants are being used. They also depend on a non-renewable source of energy to run. Considering all these points, it becomes necessary that electrical energy needs to be used efficiently since it can get exhausted.

**Materials/Resources (Low or no cost):** Charts of electrical gadgets or appliances

### Starting the lesson

Start lesson by asking learners to mention electrical appliances used in their homes. Show the learners charts of electric appliances. Ask learners how they use the appliances. Learners are likely to describe how the appliances are plugged into the wall and the plugs switched on. Lead learners to see that electric energy can be expensive and therefore should not be wasted. Ask learners what they do to conserve electricity in their homes.

Allow learners to brainstorm in their groups to come out with steps they take in order not to waste electricity. For example, put off any appliance if not being used. Do not switch light on during the day if the place is not dark. Iron in bulk and not one clothe at a time. When not in your bedroom, put the lights off from there at night. Do not use old electrical gadgets since they draw much current. Use energy efficient gadgets. Allow learners to come out with other things they do to use electric energy efficiently.

Draw learners' attention to electrical gadgets showing them the stars drawn on them. Learners observe and note that the more the stars on them, the more efficient they are.

### Summary

- Electricity is a form of energy that is used to run many gadgets in the home and industry.
- Without electrical energy, we cannot watch television, our fridges and deep freezers cannot work.
- Electricity is generated expensively and must be used for the right purposes.
- It should not be wasted.
- If a gadget is not being used, it must be switched off.

### Assessment Questions

1. Diagnostic
  - i. Name the type of energy used by most appliances in the home.
  - ii. How is this energy obtained?
2. Progressive
  - i. Is it advisable to listen to radio and watch television at the same time?
  - ii. State the kind of electric bulbs to use and why?

### Answers to assessment questions

1. Diagnostic

- i. Electric energy
  - ii. Converting various forms of energy to electric energy.
2. Progressive
- i. No, you will be wasting energy since you cannot concentrate on both at the same time.
  - ii. Energy-saving bulbs since they do not consume too much energy.

**Answers to Study Questions (Refer to LB page 137)**

1.
  - a. True
  - b. False
  - c. True
  - d. False
  - c. False
2.
  - Television set,
  - mobile phone,
  - deep freezer,
  - pressing iron,
  - refrigerator (any 4).
3. They will become hot. The amount of electricity consumed will be high and expensive
4.
  - You cannot watch television,
  - you cannot see clearly,
  - you cannot do your homework
5.
  - They are bulbs that do not become warm when heated
  - They do not waste energy
  - They save money for the user

**Diagnostic assessment for facilitator**

1. Which relevant previous knowledge helped you to present this lesson?
2. Was the interest of learners in the lesson sustained during the lesson?
3. Was there a better way you could have presented the lesson?
4. Did you vary your pedagogy in the course of the lesson?

## **STRAND 4: FORCES AND ENERGY**

### **SUB-STRAND 1: SOURCES AND FORMS OF ENERGY**

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#### **LESSON 20: Heat and Temperature**

**Reference: Learner's Book pages 138 - 143**

#### **Expected Learning Outcomes**

- Explain heat energy
- Know the meaning of temperature
- Distinguish between heat energy and temperature
- Analyse the relationship between temperature and heat energy

**Content Standard:** B5.4.1.2.1. Show understanding of the concept of heat energy in terms of its importance, effects, sources and transfer from one medium to another.

**Indicator:** B5.4.1.2.1 Show the relationship between heat and temperature.

**Core Competencies:** Personal development and Leadership, Communication and Collaboration.

**Subject Specific Practices:** Observing, Manipulating, Analysing, Generalising

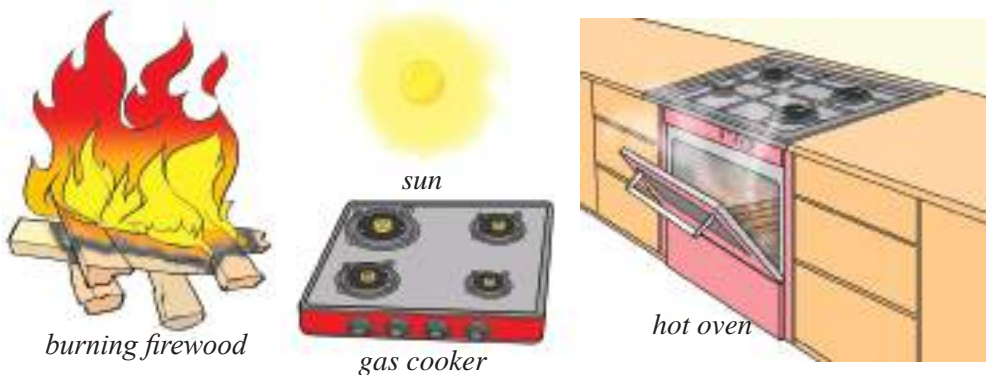
#### **Introduction**

Touch your head with your hands. Do they feel warm or cold? In our homes, food is prepared on stoves, coal pots or cookers because they all produce heat. When you visit the hospital, the nurse uses a thermometer to check how cold or warm your body is. All the examples cited relate to an important form of energy called heat energy. It makes things hot. Without this form of energy, things become cold.

**Key Words:** Temperature, warm, cold, hot, fire, electric stove, gas stove

#### **Additional Information**

Addition of heat makes things hot. Hot sensation can be felt by the sense of touch. When a metal bowl of water is placed in the sun, it becomes warm but when kept there for a long period, it can become hot. Becoming warm or hot depends on how long the body has been exposed to the source of heat. Wood fire, gas cooker, electric stove, charcoal fire can all cause things to become warm and later hot. A warm body is at a lower temperature than a hot body. Similarly, the degree of warmth of a body depends on how long it has been placed in a refrigerator. Very cold water soon begins to freeze and becomes ice block.



Adding or abstracting heat from a body changes the body's temperature.

Heat is a form of energy. As a form of energy, it has different effects on bodies when it falls on them. When heat is applied to a body it becomes hot and its temperature rises. Temperature is the degree of hotness of a body. When heat is taken from a body, the body cools down and its temperature reduces. The sun produces heat energy. We have learnt that it is this heat energy that makes the earth warm enough for all to live on it. There are other sources of heat energy. They are mostly artificial but can make things hot and thus increase temperature. Similarly, there are bodies that make bodies cold. One natural very cold source is snow or ice. Refrigerators use electrical energy to make bodies cold.

**Materials/Resources (Low or no cost):** Metal plate, water, stone, ice-cold water

### Starting the lesson

- Begin lesson by asking learners how they feel when they have malaria. They become hot. At the hospital, they are said to have temperature. Lead the discussion by asking learners what makes things hot. Elaborate on learners' responses to explain what makes bodies hot. Bodies become hot when exposed to a source of heat energy. Ask learners to mention some sources of heat that can make a body hot.
- Lead the class to relate heat to temperature. A hot body has a high temperature and a cold body has a low temperature. Help learners to note that temperature is the degree of hotness of a body. Task learners to discuss among themselves what temperature means
- Lead learners to perform activity 4.1.2.1

### The effect of heat on a body

In their groups, each group is given a metal plate. Learners are asked to touch the plates and then place them in the sun for 20 minutes and touch them again. Learners in their groups discuss their findings. Repeat the activity by using small stones. Touch them and then place them in the sun for 20 minutes and touch them again. Discuss among their group members.

Learners should also use a metal bowl of water and then place in the sun for 20 minutes.

Learners can now relate heat to temperature. Heat causes a rise in temperature. A hot body has a higher temperature than a warm body.

**Activity 4.1.2.1 (c) To feel the effect of ice-cold water on a stove.**

- In their groups, give ice-cold water to learners. Ask learners to place their stones in the cold water for 20 minutes. Remove it and touch it. Ask the groups how they feel.
- If they feel cold, what makes the stone cold?
- Lead the discussion that addition of heat makes things hot because their temperatures increase. Removal of heat makes things cold because the temperature decreases.

**Summary**

- Heat is a form of energy.
- When heat is added to any substance, the substance becomes hotter.
- Heat causes temperature to rise.
- When heat is removed from a substance, its temperature decreases and it becomes cold.
- We can use our feel of a substance to determine whether it is hot or cold.
- When one touches a metal bowl placed in the sun, it feels hot.
- This is because its temperature has risen.
- When one touches a stone placed in ice-cold water, it feels cold because its temperature has decreased.

**Assessment Questions**

1. Diagnostic
  - i. The energy that makes bodies hot is called?
  - ii. Which one has a higher temperature; hot body or warm body?
2. Progressive
  - i. How does a body placed in the sun feel?
  - ii. Why does it feel the way stated in (i)?

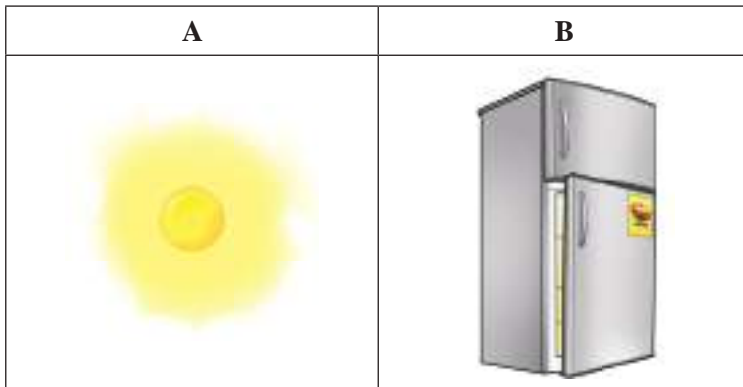
**Answers to Assessment Questions**

1. Diagnostic
  - i. Heat energy
  - ii. Hot body
2. Progressive
  - i. It feels hot.
  - ii. Because the sun radiated heat in it to make it hot.

**Answers to Study Questions (Refer to page LB 142 - 143)**

1. Heat is a form of energy which makes things hot  
When a metallic plate is placed in the sun it becomes **hot** but becomes **cold** when placed in a refrigerator. The degree of hotness in a body is called **temperature**.





2.
  - i. Hot
  - ii. It loses heat and its temperature falls
  - iii. The temperature rises
  - iv. The temperature reduces
  - v. Gas cooker, immersion heater, electric cooker

**Diagnostic assessment for facilitator**

1. Did every learner show keen interest in the lesson?
2. What pedagogy did you use to present this lesson?
3. What aspect of your lesson engaged the learners in critical thinking?

## **STRAND 4: FORCES AND ENERGY**

### **SUB-STRAND 1: SOURCES AND FORMS OF ENERGY**

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#### **LESSON 21: USING A THERMOMETER TO MEASURE TEMPERATURE**

**Reference: Learner's Book pages 144 - 150**

#### **Expected Learning Outcome**

- Explain how the thermometer works
- Distinguish between a clinical and a laboratory thermometer
- Demonstrate how to use a thermometer to measure temperature

**Content Standard:** B5.4.1.2.2. Show understanding of the concept of heat energy in terms of its importance, effects, sources and transfer from one medium to another.

**Indicator:** B5.4.1.2.2: Measure and record temperature using a thermometer.

**Core Competencies:** Critical Thinking and Problem Solving, Personal development and Leadership, Communication and Collaboration.

**Subject Specific Practices:** Analysing, Evaluating, Classifying, Observing, Recording Manipulating.

#### **Introduction**

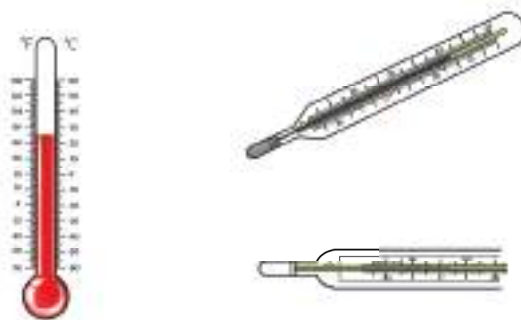
In our last lesson we learnt that temperature is a measure of the amount of heat in the body. When there is much heat in a body, we say it has a high temperature. On the other hand, if the object has a little amount of heat, we say it has a low temperature. We will learn about how to measure the amount of heat in a body.

**Key Words:** clinical, analogue,

#### **Additional Information**

A hot body has a higher temperature and can transfer the heat to a cold body. A cold body is at a lower temperature and can receive heat from a hot body. Heat thus moves from a hotter body to a colder body until the two bodies acquire the same temperature.

Thermometers are used to measure temperature. There are different types. The different types are constructed differently for particular purposes. The laboratory thermometer cannot be used to measure human body temperature accurately. Similarly, the clinical thermometer cannot be used to measure the temperature of hot bodies above a certain temperature.



*Thermometer tube containing a liquid.*

**Materials and Resources (Low or no cost):** Plastic bottles, plastic straws, dyes, water, laboratory thermometer, clinical thermometer, warm water.

### Starting the lesson

#### Procedure:

Begin lesson by asking learners to state their ideas about temperature. Questions such as, how does a hot body feel? What makes a hot body hot? How will they know how hot a body is? Similarly, what makes a cold body cold? How will you determine how cold a body is? Answers to these questions will draw learners attention to the concept of heat energy and how it manifests itself.

#### Activity 4.1.2.2 To produce an improvised thermometer

- Lead the discussion before they go into their groups about: How to make an improvised thermometer using a plastic bottle, a plastic straw, dye and water.
- Supply items to learners in their groups; plastic bottle, a plastic straw, dye and water. Ask learners to put the water is put into the plastic bottle and pour dye into it. Let them insert the plastic straw into the coloured water. The level of the coloured water will rise a little to show the movement of the liquid in a thermometer.

#### Activity 4.1.2.2 (b) Handling and using thermometers

- Laboratory thermometer (Class activity)
- Guide learners to undergo this activity.
- One learner pours a sachet of cold water into a container and puts it on a table. In their groups, they come round the table and one of the learners measure the temperature of the water. Each learner records his or her measured temperature in his or her notebook.
- The whole class discusses their recordings as you listen and guide them. Guide learners on how to handle a thermometer to obtain accurate readings.
- Show learners a clinical thermometer. Emphasize the importance of the constriction and the short range of the scale. Remind learners about the procedure of using a clinical thermometer by sterilizing it since it is used for different patients in the hospital.

**Activity 4.1.2.2 (c) To measure the body temperature using a clinical thermometer.**

- If the thermometers are available, give each group one. Where they are not available, let the learners use them in turns.
- Ask each learner to measure his or her body temperature. Ask each group to put down their names in one column and record their temperatures in the second column against it.
- Note: Provide a bottle of spirit to each table to sterilize the thermometer after each one uses it.
- They could place it under their armpits or under their tongues. Supervise this activity closely. Outline the procedure to learners as shown in their textbook page 55.

**Summary**

- Thermometers are instruments used to measure temperature.
- Temperature is the degree of hotness or coldness of a body.
- When a body gains heat, its temperature rises.
- When a body loses heat, its temperature falls.
- The amount of heat lost or gained can be calculated when the change in temperature is measured.
- There are different types of the thermometer.
- The laboratory thermometer is used mainly in the science laboratory and the clinical thermometer is used in hospitals and homes.
- The two types of thermometers contain a liquid, which could be alcohol or mercury.
- The liquid rises when used to measure the increase in temperature and falls when temperature decreases.

**Assessment Questions**

1. Diagnostic
  - i. Name the instrument used to measure human body temperature.
  - ii. What is temperature?
2. Progressive
  - i. What does the dye in the previous activity represent?
  - ii. Can the constructed thermometer be used to measure temperatures of boiling water?

**Answers to Assessment Questions**

1. Diagnostic
  - i. Clinical thermometer
  - ii. The degree of hotness of a body.
2. Progressive
  - i. The liquid in the thermometer
  - ii. No, the plastic materials can melt at high temperature.

**Answers to Study Questions (Refer to LB page 150)**

1.
  - a. Clinical thermometer
  - b. Hospital or clinic
  - c. Laboratory thermometer
  - d. Temperature
  - e. A has a kink or constriction. B has a short stem .
2.
  - i. Clinical thermometer
  - ii. Degree celcius
  - iii. Rises
  - iv. clinical
  - v. 37°C
3. The mercury will run down into the bulb as soon as it is removed from the armpit or mouth. The clinical the thermometer has kink to stop the liquid from running down

**Diagnostic assessment for facilitator**

1. Which relevant previous knowledge did you use to present this lesson?
2. Which subject specific practices did you unearth during your lesson presentation?
3. As you inspected each group to assess their creative skill in drawing, did you discover some potential in them?
4. Did you observe any good communication and collaboration among each group members during the activity carried out?

## STRAND 4: FORCES AND ENERGY

### SUB-STRAND 2: ELECTRICITY AND ELECTRONS

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#### LESSON 22: THE PARTS OF AN ELECTRIC CIRCUIT AND THEIR USES

**Reference:** Learner's Book pages 151 - 159

#### **Expected Learning Outcome**

- Identify the parts of an electric circuit
- Explain the function of each component of the electric circuit
- Construct electric circuits from some basic components

**Content Standard:** B5.4.2.1.1. Demonstrate knowledge of generation of electricity, its transmission and transformation into other forms.

**Indicator:** B5.4.2.1.1 Identify the components of an electric circuit and their functions.

**Core Competencies:** Creativity and Innovation, Personal development and Leadership, Communication and Collaboration.

**Subject Specific Practices:** Observing, Manipulating, Analysing, Evaluating, Communicating

#### **Introduction**

Electricity is a form of energy which we use in our homes and schools. There are different sources of electric energy. A useful source is a generator which produces electric current by the conversion of another type of energy into electricity. However, there are other ways of obtaining electric current such as the conversion of the sun's energy into storable electric energy. Another convenience source is by the use of metals and acids or alkaline to store chemical energy which is available as electrical energy when the need arises. Electric cells store chemical energy and produce electrons when required to do so. It is the movement of these tiny particles of matter that constitutes electric current. These particles of matter can move conveniently through wires made of metals called conductors. These conductors are joined to appliances and gadgets so that the electrons can convert the electrical energy into other forms of energy. These paths and sources and appliances together are called electric circuits.

**Key Words :** Capacitor, Resistor, Diode, Transistor, circuit symbol.

## Additional Information

Electricity is a form of energy. This energy can be transformed into other types of energy in electric appliances and gadgets. These appliances and gadgets as well as the paths through which electrons from the source move called conductors are also referred to as electric components. The path is referred to as an electric circuit. The circuit begins from a source and the source is connected to different components. The source produces electrons. The electrons move and the rate at which they move is referred to as electric current. When current gets to an electric appliance or gadget which is referred to as a component, it does many things in the component such as conversion of electric energy into light in a bulb and heat in a pressing iron.

Every electric circuit, regardless of where it is or how large or small it is, has four basic parts: an energy source, a conductor (wire), an electrical load (device), and at least one controller (switch).

In the home, how do you get electricity? What brings electricity to your bedroom? How does electric current travel from your living room to the kitchen and then to your bedroom?

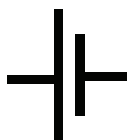
When you switch on a light, you probably don't think about what goes on to make the light actually light up. In order for the light to work well, the four basic parts of an electrical circuit must be in place to provide the power needed to produce light or to power another type of electrical device.

**Materials or Resources (Low or no cost):** Video of a simple circuit or chart showing a circuit, dry cells, connecting wires, bulb or light emitting diode.

## Starting the lesson

### Procedure

- Begin lesson by showing learners a video or a chart of an electric circuit. Explain that a circuit is a path along which electric charges or electrons move and go to do energy conversions in gadgets and appliances referred to as electric components.
- The components of an electric circuit are represented as symbols. These are circuit symbols.
- Show a few circuit symbols such as the cell (**symbol of cell**)



cell (symbol)



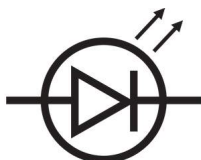
switch (symbol)



Resistor (symbol)



Bulb (symbol)



Light emitting diode (symbol)

Relate the circuit symbols to the actual components.

**Activity 4.2.1.1 (a) Construction of a simple electric circuit**

Give the following items to learners; a dry cell 1.5V, connecting wires, a light emitting diode and a switch.

Draw the circuit shown below.

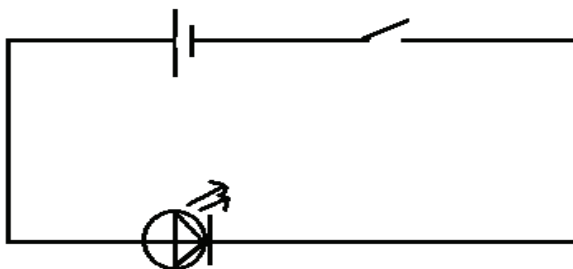


DIAGRAM OF A CIRCUIT

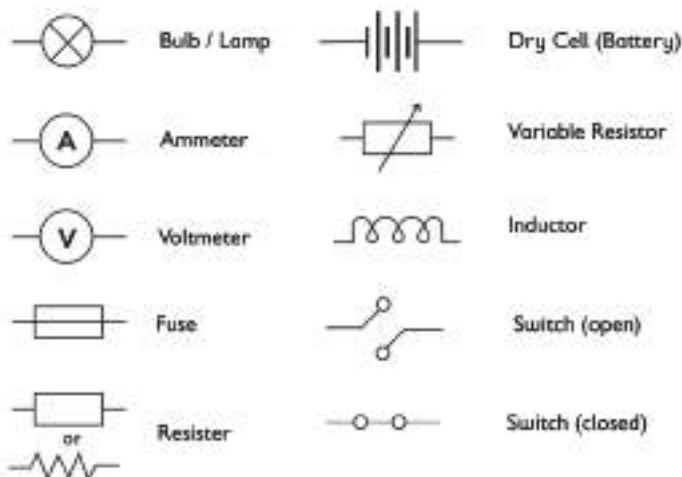
Ask learners to connect the circuit as shown to see what happens to the light emitting diode. In the diagram the positive terminal of cell is connected to the longer arm of the light emitting diode, shorter arm of the light emitting diode to the negative side of the cell.



Does the light emitting diode light up?

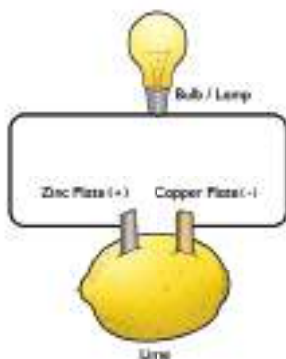
Move round and observe how learners perform the activity.

Ask learners to represent the diagram using circuit symbols.



#### Activity 4.2.1.1 (b) Using lime as a source of electricity

- Give a rod of zinc and a rod of copper to each group. Ask learners to bring lime to school, one per group.



- Instruct them to place the rods in the lime and connect the rods by a piece of connecting wire to a galvanometer. Pass the galvanometer round from group to group. Go round and observe how they perform the activity.
- Learners can also use vinegar with zinc and copper rods as a source of charges (a cell) or salt solution.

#### Activity 4.2.1.1 (c) Making an electric cell using salt solution

- Lead this activity by preparing a 0.1 moles per  $\text{dm}^3$  sodium chloride solution.
- Supply about 50  $\text{cm}^3$  of the solution to learners.

- Supply them with a plastic bottle and an aluminium rod and a carbon rod with connecting wires and a light emitting diode.
- Ask learners to connect the rods dipped in the salt solution with the wires to the light emitting diode.
- Discuss their observations as you move round to observe how they do the exercise.

*Project: Assist learners to build a LED lantern using the circuit with salt solution.*

### Summary

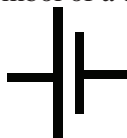
- An electric circuit is the arrangement of the components in an orderly manner to enable appliances and gadgets to convert electrical energy into other forms of energy.
- An electric circuit has four main components namely, the source of energy, the load, the connecting wire and the switch.
- The energy source or battery provides electrical energy to help the circuit to work..
- The connecting wire carries electricity across the circuit.
- The switch is used to turn the circuit on or off.
- They allow electric current to flow when it is turned on.
- The load which is the light emitting diode or bulbs convert electrical energy into light.

### Assessment Questions

1. Diagnostic
  - i. What is the function of connecting wires in a circuit?
  - ii. Name the component of an electric circuit which produces electrons.
2. Progressive
  - i. Draw the circuit symbol of a cell.
  - ii. State the energy transformation that takes place in a light emitting diode.

### Answers to Assessment Questions (Refer to page

1. Diagnostic
  - i. They carry electrons from the source to the components of the circuit.
  - ii. The cell
2. Progressive
  - i. symbol of a cell



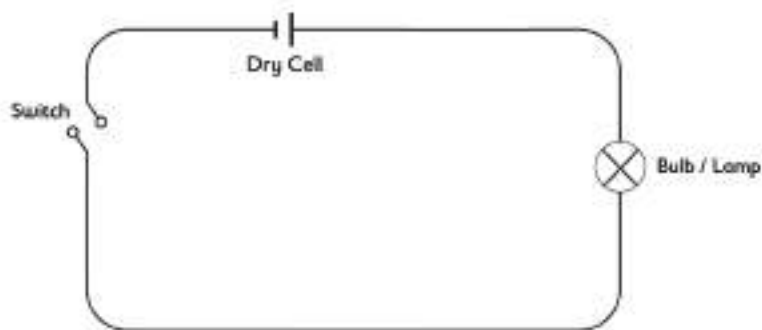
- ii. electrical to light

**Answers to Study Question (Refer to LB page 159)**

1. Use the diagram above to answer questions a to d.
  - a. identify the parts labelled I, II, III, and IV in the diagram.
  - b. What does I do in the circuit?
  - c. State the energy transformation that takes place in IV.
  - d. What is the function of III in the circuit?
2.
  - i. Battery
  - ii. Switch
  - iii. Resistor
  - iv. Wire

An electric circuit showing the four basic parts.

3.

**Diagnostic assessment for facilitator**

1. What did you do to make sure every learner benefited from the lesson
2. Were all the learners able to engage in hands-on activity?
3. Were you able to deliver the full content of the lesson within the stipulated time ?
4. How did you conclude the lesson?

## STRAND 4: FORCES AND ENERGY

### SUB-STRAND 3: FORCES AND MOVEMENT

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#### LESSON 23: FRICTION AND ITS EFFECTS

**Reference:** Learner's Book pages 160 - 166

##### **Expected Learning Outcome**

- Know friction as a force
- Identify everyday applications of friction
- Explain how to reduce friction
- Demonstrate the effect of friction

**Content Standard:** B5.4.3.1.1. Know that movement is caused by applied forces due to the release of stored energy.

**Indicator:** B5.4.3.1.1 Explain the term friction, its effects and applications.

**Core Competencies:** Creativity and Innovation, Personal development and Leadership, Communication and Collaboration, Critical Thinking and Problem Solving.

**Subject Specific Practices:** Observing, Manipulating, Predicting, Analysing, Evaluating, Generalising, Communicating, Designing

##### **Introduction**

In basic three, you learnt about forces, and how they cause movement. You learnt that a force is a push or pull, which causes a body to start moving when it is stationary and to stop moving when acted upon by a force. Have you ever travelled in a vehicle during a rainfall? Have you noticed that a vehicle travelling when rain is falling slows down? Generally, when the road is wet, vehicles slow down. They speed up when the surface of the road is dry. A wet road becomes slippery due to reduction of friction. The question is what is friction?

**Key Words:** friction, wet roads, oil spills, shoes, smooth, polished, surfaces, tyres, walking, fall.

##### **Additional Information**

Friction occurs when two surfaces are in contact and one is sliding over the other one. Placing two surfaces in contact will not cause friction – It is only when one surface is sliding over the other surface. Friction opposes motion so it will slow down the moving surface. To start a body moving, a force will have to be applied. Part of this force is used to overcome the frictional force. As the body slides over the other surface, frictional force still opposes the motion. This is why the force moving the body forward will have to be greater. When they become equal, the

body cannot move forward again and it stops. Friction is reduced when the two surfaces become wet or oil and grease are applied between them. To reduce friction, the surfaces are oiled, greased, polished and made smoother. Machine parts must therefore be oiled. This is called lubrication.

We know that a force is a push or pull and causes objects to start moving, stop moving, change their direction of movement, increases their speed, decreases their speed or change their shape if elastic. Friction is a force that opposes the relative sliding motion of two surfaces in contact. It is a very important type of force. It helps in movement when we walk. Without frictional force, we cannot walk. We will be slipping and falling all the time. Friction helps vehicle tyres to hold on to the surface of the road otherwise vehicles will be skidding off the road.

Despite these advantages, friction has a few disadvantages such as causing wear and tear of machine parts as they move on each other. In this lesson, we will learn about friction and its effects on bodies.

**Materials or Resources (Low or no cost):** Palms of learners, learners' shoes, vehicle tyre; one new and one worn out, toy car.

**Procedure**

- Begin lesson by asking learners to discuss what a force is. Ask them to state the effects of a force on a body. Learners discuss forces and their effects on bodies they act on. Ask learners to name the types of forces they encounter in their everyday activities. Learners name the types of forces.
- Ask learners whether they have travelled on a wet road and their experiences to introduce the idea of friction. If they have ever slipped on a wet floor or on a banana peel left carelessly on the floor.
- You can use their responses to introduce the idea of friction.

**Activity 4.3.1.1 (a) Effect of rubbing palms together**

- Ask learners to perform the activity group by group and discuss among themselves.
- One member of each group shares his or her experience with the class.
- Lead the class to see that the palms, when rubbed together become hot because of friction between them and when the palms are used to touch the cheeks, they feel warm.

**Activity 4.3.1.1 (b) To show the wearing away of the heels of shoes due to friction.**

- Ask learners in their groups to observe the soles of their shoes or sandals to identify those which have worn out.
- Lead discussion on why soles of footwear wear away. This is due to friction as learners walk to and from school.
- Lead class to observe tyres. Worn out tyres and new tyres. Helps learners to observe that new tyres have deeper ridges on them to increase their grip on the road. As the tyre wears off, the ridges disappear. It is therefore not advisable to use worn out tyres.

*Project: Ask learners to bring toy cars to school for the project.*

*Learners should pull their toy cars on a rough surface and on a smooth surface and compare their movement. They should report to the general class after discussion in their groups.*

### Summary

Friction is a form of force that resists the free movement of two objects that are in contact with each other. It is this force that prevents us from falling when we are walking. However it causes the soles of our shoes to get worn. On rainy days, friction is reduced which causes cars to slid off the road. Applying oil or grease reduces the friction between two surfaces.

### Assessment Question

1. Diagnostic
  - i. List two types of forces
  - ii. State any two effects of forces
2. Progressive
  - i. Name the force that opposes the relative sliding motion of two surfaces in contact.
  - ii. Does friction occur on a stationary body?

### Answers to Assessment Questions

1. Diagnostic
  - i. pull, push, friction, cohesion, adhesion, etc.
  - ii. move, stop, change direction, increase speed, slow down, etc.
2. Progressive
  - i. Friction
  - ii. No, only on a sliding body.

### Answers to Study Questions (Refer to LB page 166)

1. Good effects: It enables walking, It also makes holding pen possible  
Bad effects: It generates heat. It also causes wear and tear
2. Friction is a form of **force**. It opposes the **motion** of two surfaces in contact with each other. This force also keeps us from **falling**. Friction is reduced when the ground becomes **wet** it can also be reduced by **oiling**
3. a. Friction is a **contact** Force.  
b. When running, friction Stops us from falling  
c. An example of a material that causes a lot of friction is a Rough surface  
d. We can reduce friction with **a lubricant**

**Diagnostic assessment for facilitator**

1. How did you start the lesson?
2. Did you vary your methodology in the course of the lesson?
3. Were the exemplars used relevant to the lesson?
4. What did you do to create the atmosphere for creativity and critical thinking in the course of the lesson?
5. Were learners able to do the assessment task for their workbooks or learner's book?

## STRAND 5: HUMANS AND THE ENVIRONMENT

### SUBSTRAND 1: PERSONAL HYGIENE AND SANITATION

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#### LESSON 24: IMPORTANCE OF WASHING CLOTHES REGULARLY

**Reference:** Learner's Book pages 168 - 172

##### **Expected Learning Outcomes**

- Explain the need to wash clothes regularly
- Identify the items used in washing dirty clothes
- Know how to wash dirty clothes

**Content Standard:** B5.5.1.1.1. Recognise the importance of personal hygiene

**Indicators:** B.5.1.1.1. Know why it is important to wash clothes regularly

**Core Competencies:** Critical thinking and Problem-Solving, Collaboration and communication, Personal Development and Leadership, Digital literacy, Creativity and Innovation.

**Subject Specific Practices:** Observing, Manipulating, Analysing, Evaluating, Designing, Creating

##### **Introduction**

The clothes we wear are very important part of our life. Since they are materials that are in direct contact with our body, it is very important we keep them as clean as possible. We live in an environment which contains many living organisms. There are some of the living organisms we cannot see with our naked eyes. Some of these living organisms are not harmful. Others are harmful to us by causing diseases. We call them germs. If we do not wash our clothes regularly we harbour these germs and they end up attacking our skin to cause skin diseases.

**Key Words:** detergents, clothes, wash, dirty, skin disease

##### **Additional Information**

Whatever we do in our environment affects us positively or negatively. Personal hygiene is important to us because if we practice personal hygiene we will be healthy and strong.

Personal hygiene includes activities such as:

- Washing our hands with soap and rinsing them with clean water.
- Cleaning our teeth.
- Bathing.
- Keeping our finger nails short and clean
- Washing and taking good care of our hair'



- Washing and drying our clothes

If we do not follow the activities listed above very well, we will not be healthy and will be sick often.



- Why must you wash your hands with soap and water after school?
- Why must you rinse your hands in clean water after washing with soap?
- Always wash your hands with soap.
- After washing with soap, rinse the soap from your hands in clean water
- When you come to school, you play with your hands and nails. You must therefore wash your hands with soap and rinse them with clean water to remove the soap.

#### **Activity 5.1.1.1: Items needed to wash clothes and underwear**

**Materials/Resources (Low or no cost):** soap, water, dirty clothes and dirty underwear

##### **Procedure**

- Tell learners in groups of four or five to discuss what items are needed to wash their clothes and underwear.
- Tell learners to let the leader of each group to present their idea to the whole class.
- Present to learners soap, water, dirty clothes and dirty underwear.
- Demonstrate to learners how the washing of the clothes is done.
- Tell leaders of each group to follow your demonstration
- Show a video or pictures showing other methods of washing clothes and underwear, apart from the hands to learners
- Tell learners in pairs in their groups, to discuss and share ideas on what will happen if they do not wash their clothes and underwear regularly.
- Guide learners to design personal roster for washing their clothes, indicating the days and times which they will use to wash their dirty clothes.

##### **Summary**

- We need to wear clean clothes at all times.
- Dirty clothes can give us foul body odour.
- They also help to transmit skin diseases.
- Soap, water, buckets and detergents are used for washing dirty clothes.
- We have to wash our personal belongings including school uniforms regularly.

### Diagnostic Assessment

1. a. What is personal hygiene?  
b. Write down two things that you observe about a person to show that he or she is practicing personal hygiene
2. What will happen if you do not wash your clothes and underwear regularly?

### Answers to Diagnostic Assessment

1. a. It is the practice of keeping our body clean  
b. Bathing regularly, washing our clothes regularly, keeping our finger nails short and clean, brushing our teeth regularly (any 2)

### Progressive Assessment

If you wash your clothes with only water what do you think will happen?

### Answers to Progressive Assessment

Using water alone to wash our clothes cannot remove all the dirt and the germs that cause diseases

### Answer to Study Questions (Refer to LB page 172)

1.
  - i. Washing our hands with soap and rinsing them with clean water.
  - ii. Cleaning our teeth.
  - iii. Bathing.
  - iv. Keeping our finger nails short and clean
  - v. Washing and taking good care of our hair'
  - vi. Washing and drying our clothes
  - vii. (Any 4)
2. All the germs that cause disease will not be washed away.
3. To get rid of dirt and the germs that causes diseases
4. Soap, water, bucket, detergent (any 3)
5.
  - i. apply the soap directly to any stains or dirty spots in the clothes.
  - ii. You can let the clothes soak in the clean water for about 10 minutes to remove the soap with ease.
  - iii. After that rub the fabric against itself to remove the stains.
  - iv. After that you can drain the soapy water from your clothes and rinse the garment in clean water to get rid of excess soap and detergent.
  - v. You then squeeze and ring out the water with your hands, removing as much water as you can.
  - vi. You can then hung the clothes on a drying line or on a neat floor or grass for it to dry

**Diagnostic assessment for facilitator**

1. What core competences can you identify being developed in the learners?
2. Were there more hands-on to make use of resources?
3. Did the learners realise the importance of washing their clothes regularly?
4. What measure did you put in place to obtain feedback from parents of learners as to whether they (learners) practice regular washing of their clothes

## **STRAND 5: HUMANS AND THE ENVIRONMENT**

### **SUBSTRAND 1: PERSONAL HYGIENE AND SANITATION**

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#### **LESSON 25: KEEPING OUR WASHROOMS CLEAN**

**Reference: Learner's Book pages 173 - 177**

#### **Expected Learning Outcomes**

- Evaluate the risks of using dirty washrooms
- Identify habits that make the washroom dirty
- Demonstrate how to clean washrooms

**Content Standards:** B5.5.1.2.1. Identify, discuss and appreciate the natural and human features of the environment and the need to keep the environment clean

**Indicators:** B5.5.1.2.1 Know how to keep washrooms clean.

**Core Competencies:** Critical thinking and Problem-Solving, Collaboration and Communication, Personal Development and Leadership, Digital literacy

**Subject Specific Practices:** Observing, Analysing, Evaluating,

#### **Introduction**

We visit the toilet every day. Visiting the toilet is a very important practice. No human can do without urinating or defaecating. We visit the toilet to urinate or defaecate. We need to keep the place where we urinate and defaecate clean all the time. The place where we urinate and defaecate is called the washroom. We need to keep our washroom clean.

**Key words:** Washroom, water closet, disinfectant, toilet, urinate, defaecate.

#### **Additional Information**

When we wake up from bed in the morning one of the most important things we do before we go out to school is to visit the washroom to urinate and defaecate before bathing. This is a very important practice which we cannot do without. It makes sure that we feel comfortable. Faeces and urine may contain germs that cause diseases. We need to wash any trace of urine and faeces away so that they do not enter our body to make us fall sick. A washroom is a room which has facilities to enable you urinate, defaecate and wash your hands with soap and water after doing so. There are certain poems and rhymes which can always remind us to keep our washrooms clean.

### Starting the lesson

You can start the lesson by asking the learners whether they visited the washroom before coming to school.

You can then ask learners to recite a poem or a rhyme about cleanliness.

Recite the rhyme:

*Cleanliness is next to holiness  
The Bible teaches us so  
Keep yourself clean  
Keep your home clean  
And your environment will be clean.*

*Cleanliness is next to holiness  
The bible teaches us so  
When you keep yourself clean  
Your environment will be clean  
And your community will be clean too.*

Remind learners about the fact that the washroom is part of their environment. He or she goes ahead to show them diagrams about the different ways of keeping our environment clean.



### Cleaning the water closet

- Tell learners, in groups of four or five, to discuss different ways of keeping the compound clean.
- Show learners pictures and videos on how to keep washrooms clean.
- Lead learners to discuss how to keep the lavatory clean by:
  - i. flushing immediately after use
  - ii. urinating directly in the toilet bowl
  - iii. keeping used tissues in waste containers rather than throwing them on the floor.
  - iv. regularly removing used tissues and burning them.

**Activity 5.1.2.1:** Investigating the risks associated with the use of dirty washrooms.

**Materials/Resources (Low or no cost):** Manila card, permanent white board markers of different colours.

**Procedure**

1. Tell learners in their groups to investigate the risks associated with the use of dirty washrooms.  
Tell learners to present a report to you for discussion in class
2. Tell learners in their groups to design a poster to be posted in the school's washroom.  
(This will show your understanding of how to keep washrooms clean)

Example of poster is;    Flush toilet after use  
    Keep washroom clean

**Summary**

- We must keep our washrooms clean at all times.
- Dirty washrooms bring about sicknesses.
- The washroom must be swept and all used tissue must be disposed off.

**Diagnostic Assessment**

1. a. What is a washroom?  
b. Write down three parts of our environment.
  
2. a. Flush you toilet after use at the end of each week. Sate whether it is a good practice and give reasons.  
b. Name two objects you will use to clean your washroom.

**Answers to Diagnostic Assessment**

1. a. A washroom is a room which has facilities to enable you urinate, defaecate and wash your hands with soap and water after doing so.  
b. Bathroom, washroom, classroom, bedroom, living room (any 3 or any other correct 3)
2. a. It not a good practice. You have to flush the toilet immediately after going to toilet.  
b. Hand gloves, mop, disinfectant ( any 2 or any other 2 correct objects)

**Progressive Assessment**

What items will you recommend all public toilets in towns and villages should have?

**Answers to Progressive Assessment**

They should have the following: Soap, water, dustbin, mop, hand gloves, nose mask, toilet roll, disinfectant, deodorant.

**Answers to Study Questions (Refer to LB page 176 - 177)**

1. The washroom is part of our **environment**. We need to keep the washroom **clean** at all times. We must avoid **littering** the washroom with used tissue. The floor of the washroom must always be **dry** and the used tissue must be **burnt** regularly.

2.
  - a. Removing used tissues and burning them at the end of each year.
  - b. Throwing used tissue on the floor.
  - c. Flushing after use at the end of each week.
  - d. Urinating directly on the cover of the toilet bowl.
3. Draw any two items used for cleaning washrooms.



**Diagnostic assessment for facilitator**

1. What core competences can you identify being developed in the learners?
2. Were there more hands-on to make use of resources?
3. Did the learners realise the importance of keeping their washroom clean?
4. What measure did you put in place to obtain feedback from parents of learners as to whether they (learners) participate in keeping their washroom clean?

**STRAND 5: HUMANS AND THE ENVIRONMENT**  
**SUBSTRAND 1: PERSONAL HYGIENE AND SANITATION**

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**LESSON 26: KEEPING THE ENVIRONMENT CLEAN**

**Reference: Learner's Book pages 178 - 184**

**Expected Learning Outcomes**

- Identify human habits that make the environment untidy
- Demonstrate how to keep the environment clean at all times

**Content Standard:** B5.5.1.2.2. Identify, discuss and appreciate the natural and human features of the environment and the need to keep the environment clean

**Indicators:** B5.5.1.2.2 Demonstrate how to clean the environment regularly.

**Core Competencies:** Critical thinking and Problem-Solving, Cultural Identity and Global Citizenship, Collaboration and communication, Personal Development and Leadership, Creativity and Innovation

**Subject Specific Practices:** Observing, Manipulating, Analysing, Evaluating, Designing, Interpreting, Communicating

**Introduction**

We can only be sure of good health if we live in a clean environment. Our classrooms, school compound, bathrooms, washrooms and gutters are parts of our environment. We need to know how to keep all these places clean. We do not only talk about how to clean these places but we need to demonstrate how to it.

**Key words:** Environment, cleanliness, mopping, Hoovering.

**Additional Information**

We know of the saying that cleanliness is next to godliness. Everybody in a sound mind appreciates a clean environment and wishes to live in such an environment. The main issue now is how to do it and doing it. Living in a clean environment ensures good health. There are items we can use to clean our environment. Each item could be used in a particular way to achieve our aim of cleanliness. For example, a broom could be used to sweep but cannot be used to mop. We need to know and recite some poems and rhymes to reminds us about cleaning our environment. An example of such rhyme is as follows:





The pictures above show various items for cleaning the environment. In their groups (four or five in a group), let the learners discuss the pictures and understand it well.

### Starting the lesson

Start the lesson by leading learner to sing a song, recite a poem or a rhyme as follows:

Recite the rhyme

*Cleanliness is next to holiness*

*The Bible teaches us so*

*Keep yourself clean*

*Keep your home clean*

*And your environment will be clean.*

*Cleanliness is next to holiness  
The bible teaches us so  
When you keep yourself clean  
Your environment will be clean  
And your community will be clean too.*

### **Activity 5.1.2.2 (a) Observing tidy and untidy parts of the community**

**Materials/Resources (Low or no cost):** camera

#### **Procedure**

- Take learners out to the community to observe tidy and untidy parts depicting clean and unclean environment.
- Take a picture of the places visited.
- Show to learners different pictures depicting clean and unclean environment.
- Lead learners to discuss how to make the unclean environment as clean as those that are clean.
- Tell leaders in each group of learners to lead the group to discuss some materials that are used for cleaning the home, the school and the community.

### **Activity 5.1.2.2 (b): Correct way of using cleaning tools.**

**Materials/Resources (Low or no cost):** brooms, dustpans, rags, ceiling brush and dustbins.

#### **Procedure**

- Demonstrate for learners to see the correct way of using cleaning the following tools: brooms, dustpans, rags, ceiling brush and dustbins.
- Lead learners to discuss, understand and know the need to keep the environment clean.
- Tell learners in groups, to use local cleaning tools to clean the classroom and the school environment.

#### **Project**

*Tell learners in their groups, to design posters to create awareness on the need to keep the school, home and community clean and exhibit their work in the school.*

Example of poster is: **Do not throw rubbish about.**

Lead learners to form an environmental awareness club in the class.

#### **Summary**

- We must learn to keep the environment clean at all times.
- Our classrooms, school compounds, homes and communities must be swept regularly.
- We need to avoid putting litter on the floor.
- Brooms, dustpans, rags, ceiling brush and dustbins are examples of cleaning tools that are used to keep the environment clean and healthy.

### Diagnostic Assessment

1. Why is it important to clean our environment?
2. Mention two parts of our environment that need to be clean and the items you can use to clean each one of them

### Answers to Diagnostic Assessment

1. To get rid of germs that can make us sick
2. Classroom= broom, ceiling brush, mop  
Gutter = shovel, hand gloves, wellington, nose mask  
Washroom= hand glove, nose mask, mop

### Progressive Assessment

1. Why do you need to use the following items to clean the environment?
  - i. shovel
  - ii. nose mask

### Answers to Progressive Assessment

- i. Its shape enables you to remove rubbish from the gutter.
- ii. It prevent dust particles that carry germs and bad odour from entering your body through your nose

### Answers to Study Questions (Refer to LB page 184)

1. Brooms, dustpans, rags, ceiling brush and dustbins. (Any 3)
- 2.

**Do not throw rubbish about**

**Cleanliness is next to godliness**

**A clean body in a clean environment**

3. He must organise people to
  - i. clean gutters,
  - ii. sweep classroom,
  - iii. remove cobwebs,
  - iv. make sure no rubbish is littered around
  - v. put dustbins at vantage points.
4.
  - i. They are not keeping their environment clean.

- ii. They are not covering their food,
- iii. they are not washing their hands well with soap and water before eating
- iv. They are not eating hot food
- v. (Any 3)

**Diagnostic assessment for facilitator**

1. Did you observe any good communication and collaboration among each group members during the activity carried out?
2. Did you make the learners realise that they also contribute in making the environment unclean and that they can equally contribute to make it clean?
3. Did you identify any element of global citizenship and cultural identity exhibited by the learners during the lesson?
4. Did you discover learners exhibiting problem solving ability during the lesson ?

## STRAND 5: HUMANS AND THE ENVIRONMENT

### SUBSTRAND 2: DISEASES

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#### LESSON 27: CHICKEN POX DISEASE

**Reference:** Learner's Book pages 184 - 189

#### Expected Learning Outcomes

- Know how chicken pox is spread
- Identify the symptoms of chicken pox
- Explain how chicken pox can be prevented

**Content Standard:** B5.5.2.1 Know common diseases of humans; causes, symptoms, effects and prevention

**Indicators:** B5.5.2.1.1 Explain the causes, symptoms and control of chicken pox

**Core Competencies:** Critical thinking and Problem-Solving, Collaboration and communication, Personal Development and Leadership, Digital literacy

**Subject Specific Practices:** Analysing, Evaluating, Designing, Interpreting

#### Introduction

There are some common diseases that can affect humans. Some of these diseases affect the skin. Chickenpox is an example of diseases that affects the skin of humans.

**Key words:** chickenpox, causes, symptoms, Fever, appetite, aching

#### Additional Information

Not until you know some common diseases of humans their causes, symptoms, effects and prevention you not be able to fight them. Chicken pox is a common disease that affects humans. It is caused by virus. The virus can enter your body when you breathe in air which contains the virus. When a person infected by the disease breathes, the viruses come out in the tiny droplets of water that floats in the air which people close to him or her can breathe in. Once the person breathes in he or she also becomes infected. You can also be infected by the disease when your body touches an infected person.

The symptoms of chicken pox include fever, aching muscle, loss of appetite, generally not feeling of well, rashes, red spots which develop in clusters, blisters develop on top of spots. The disease is dangerous to new-born babies. It is also dangerous to people who are first infected in adulthood. Persons who are infected with the chickenpox disease have to be isolated so that

they do not spread the disease. People have to avoid contact with other people infected with the disease. People have to avoid using the same clothes with infected persons.

### Starting the lesson

Show to learners the pictures, videos or charts on causes, symptoms and control of chicken pox.

You may also invite a health personnel or School Health Education Programme (SHEP) coordinator to give a talk to learners on chicken pox.

ell learners in pairs, to answer the following questions based on the pictures and video:

1. What causes chicken pox?
2. What are the symptoms of chicken pox?
3. What should be done if someone has chicken pox?
4. What are the ways of preventing the spread of chicken pox?

**Project:** Ask learners develop a concept map to trace the causes, symptoms and prevention of chicken pox.



### Summary

- Chicken pox is a common disease that affects humans.
- It is caused by a virus.
- The virus can enter your body when you breathe in air that contains the virus.
- The symptoms of chicken pox include fever, aching muscles, loss of appetite, generally not feeling well, rashes, red spots that develop in clusters, and blisters that develop on top of the red spots.

### Diagnostic Assessment

1. Name the germ that causes chickenpox
2. Where is the germ that causes chickenpox found?

### Answers to Diagnostic Assessment

1. Fungus
2. In the air or on the skin or the breath of people infected with the disease

**Progressive Assessment**




1. What sign will you see on a person to conclude that he or she is suffering from chickenpox?
2. Which part of the body suffers when a person is has chickenpox?
3. How does a person suffering from chicken pox feel?

**Answers to Progressive Assessment**

1. Rashes, red spots which develop in clusters, blisters develop on top of spots
2. The skin
3. fever, aching muscle, loss of appetite, generally not feeling of well, pains from the rashes, red spots which develop in clusters and the blisters

**Answers to Study Questions (Refer to page LB 188 - 189)**

1. Virus
2. Fever, aching muscle, loss of appetite, generally not feeling of well, rashes, red spots which develop in clusters, blisters develop on top of spots. Any 4
3. He or she has to be isolated. People have to avoid contact with him or her. People have to avoid using the same clothes with him or her.
4. Isolating infected people in from the community. Avoiding contact with other people infected with the disease. Avoiding using the same clothes with infected persons.
- 5.

Stage of disease	Appearance	Signs/ symptoms
A		Fever, aching muscle,
B		loss of appetite, generally not feeling of well.
C		Rashes, red spots which develop in clusters, blisters develop on top of spots.

- a. He came into contact with other people infected with the disease.
- b. He is feeling feverish, having aching muscle, loss of appetite, generally not feeling of well
- c. He needs to go to the hospital and avoid contact with people

**Diagnostic assessment for facilitator**

1. Did you draw the attention of learners to a previous knowledge?
2. Did you disclose learning expectations with learners?
3. Did your pedagogy enable you to deliver the lesson successfully?
4. Did you present the lesson in order
5. Did you refer learners to exercises in the workbook and the learners book? er's book?



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**STRAND 5: HUMANS AND THE ENVIRONMENT**  
**SUB-STRAND 2: DISEASES**

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**LESSON 28: CHOLERA****Reference: Learner's Book pages 190 - 195****Expected Learning Outcomes**

- Know how cholera is spread
- Identify the symptoms of cholera
- Explain how cholera can be prevented

**Content Standard:** B5.5.2.1 Know common diseases of humans; causes, symptoms, effects and prevention**Indicators:** B5.5.2.1.2 Identify causes, symptoms and prevention of cholera**Core Competencies:** Critical thinking and Problem-Solving, Collaboration and communication, Personal Development and Leadership, Digital literacy,**Subject Specific Practices:** Analysing, Generating,**Introduction**

In your previous lesson you taught learners about chicken pox. You taught them that chicken pox is a common skin disease. In this lesson, you will teach them about a common disease that spreads through water and food. The name of the disease is cholera. Learners will find out more about its causes, and how it can be prevented.

**Key Words:** diarrhoea, stool, abdominal, dehydrated**Additional Information**

Unlike chickenpox which affects the skin, cholera affects intestines. It has its causes and symptoms which you can use to identify it. Knowing what causes cholera can help us prevent it. Cholera is caused by a bacterium called *Vibrio cholerae*

It can be obtained when one takes in food or water contaminated with faeces, urine or oral secretions of an infected person. It can be spread by housefly which carries it from the faeces or vomit of an infected person and settles on food. When you eat such food, you will be infected by the disease. In order not to get the disease, you have to cover your food always. You also have to eat hot food.

Cholera is most likely to be found at places where there is poor sanitation, inadequate hygiene

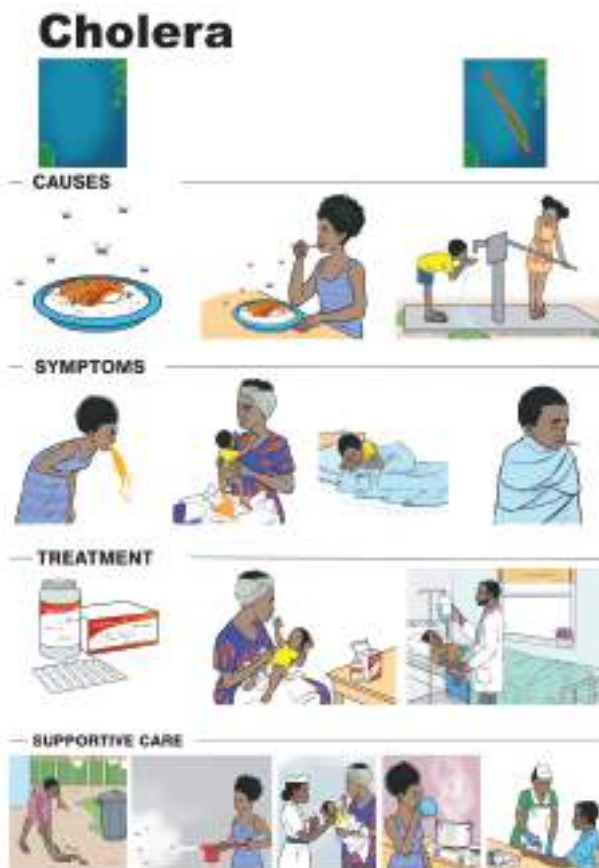
and where water is not treated well before drinking. You will not contract the disease if you always practice good hygiene as you learnt in previous lessons. If you always wash your hands well with soap before eating, wash fruits well such as mangoes and apples with salt water and vinegar, you will not get the disease.

A person who has cholera:

- suffers severe diarrhoea(watery stool)
- vomits
- suffers abdominal pains

A person who has cholera and starts going to toilet very frequently with watery stool (diarrhoea) and vomiting, loses a lot of water from the body. After losing a lot of water, the body becomes dehydrated. The person can die if not treated immediately.

Show to learners videos, if available, that shows the causes, symptoms and prevention of cholera.



**Starting the lesson**

You may start this lesson with newspaper story he or she has read about cholera outbreak or radio or television report about the disease.

Show to learners, pictures and videos or images showing the causes, symptoms and prevention of cholera.

You may invite a local health officer or SHEP coordinator to give a presentation on cholera to the learners.

Engage learners, in groups of four or five, to discuss the causes of cholera using everyday scenarios such as eating contaminated food and living in a dirty environment.

Provide learners with a large cardboard for all the groups to write different ideas on the causes, prevention and symptoms of cholera.

Go round to inspect what the learners are doing and guide them where necessary. Tell learners to display the cardboard in the classroom.

**Summary**

- Cholera is caused by a bacterium called *Vibrio cholerae* .
- We can contract cholera through eating of food or drinking water that is contaminated with faeces, urine or oral secretions of an infected person.
- A person who has cholera suffers severe diarrhoea (watery stool), vomits and suffers abdominal pains.
- Keeping good personal hygiene can help to prevent cholera.

**Diagnostic Assessment**

1. What germ causes cholera?
2. What signs will you see on a person to say that he or she has cholera?

**Answers to Diagnostic Assessment**

1. Bacteria
2. diarrhoea (watery stool),vomiting and abdominal pains

**Progressive Assessment**

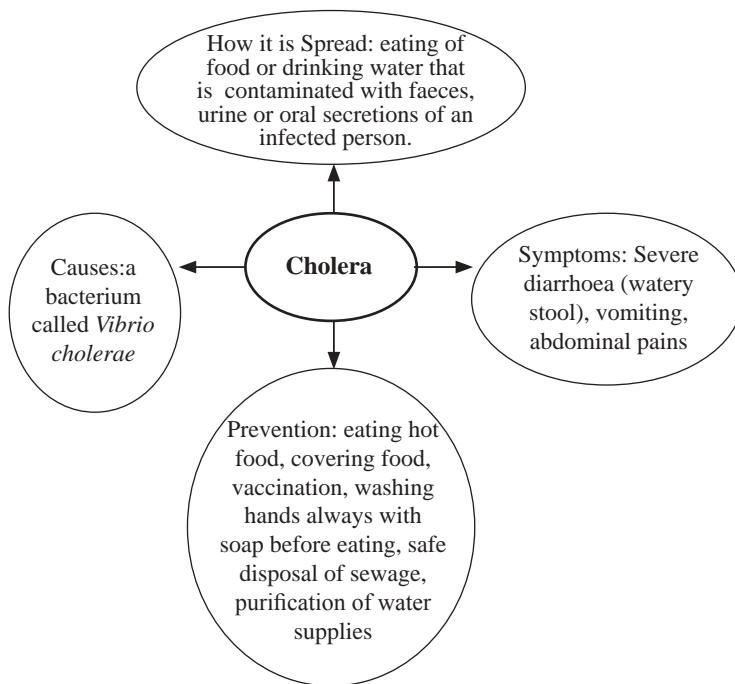
1. How will make sure that you are not affected by cholera when one of your close relative in your home is suffering from the disease.

**Answers to Progressive Assessment**

Cover food always. Eat hot food. Always wash hands well with soap before eating. Wash fruits such as mangoes and apples with salt water and vinegar well.

**Answers to Study Questions (Refer to LB page 195)**

1.
  - i. Cholera is caused by a bacterium called *Vibrio cholerae*
  - ii. Write down any three symptoms of someone suffering from cholera
    - Severe diarrhoea (watery stool),
    - vomiting
    - abdominal pains
  - iii. Eating of food or drinking water that is contaminated with faeces, urine or oral secretions of an infected person.
2.
  - eating hot food
  - covering food
  - vaccination
  - washing hands always with soap before eating
  - safe disposal of sewage
  - purification of water supplies(Any 3)
3. Draw the Concept Map on Cholera below in your book and complete it.



4.
  - i. False
  - ii. True.
  - iii. False
  - iv. True.
  - v. False

**Diagnostic assessment for facilitator**

1. Did you discuss diagnostic and progressive assessment meant for learners
2. Did you find out whether any of the learners or any of their relatives had been affected by cholera?
3. Were the learners curious to learn more about cholera?
4. Did you use assessment for learning strategies well during the lesson?

## STRAND 5: HUMANS AND THE ENVIRONMENT

### SUB STRAND 3: SCIENCE AND INDUSTRY

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#### LESSON 29: RAW MATERIALS USED IN LOCAL INDUSTRIES

**Reference:** Learner's Book pages 196 - 201

#### **Expected learning Outcomes**

- Identify industries within the local community
- Name the raw materials used in the local industries
- Relate the raw materials to the goods produced in each industry

**Content Standards:** B5.5.3.1 Recognise the impact of science and technology in society

**Indicators:** B5.5.3.1.1 Identify the raw materials used in some local industries (kenkey production, gari production, ceramic and pottery production)

**Core Competencies:** Critical thinking and Problem-Solving, Collaboration and communication, Personal Development and Leadership, Digital literacy,

**Subject Specific Practices:** Observing, Analysing, Evaluating, Planning, Designing, Interpreting,

New Words: pottery, blacksmith,

#### **Introduction**

There are many local industries in Ghana. Each local industry uses local raw materials. These materials are processed for consumption. Certain techniques are required and used to process these raw materials. Examples of a local industry include gari and kenkey industries which use cassava and maize respectively as raw materials.

**Key words:** raw materials, production, industry

#### **Additional Information**

Science and technology have great impact in society. This has become clear from previous lessons. Every industry uses some materials to make their products. The materials that are used to make such products are the raw materials. They are basic materials that are used to produce goods, finished products or intermediate materials. For example, cassava dough made from cassava is a raw material for Gari industry.

In our communities there are different craftsmen, artisans and traders who work daily to produce different goods and services. Some of them prepare food, whilst others make furniture. They work using raw materials that are obtained from the community or its environs.

### Starting the lesson

Start lesson by asking learner the food they ate the previous day. Select Kenkey or gari from the response some learners are likely to give. Draw attention of learners to the industry the produces these the gari and kenkey. Draw learners attention to other local industries.

You could take learners to a local gari, kenkey, shea butter, cooking oil, blacksmith, basketry, carpentry or pottery production site or show to you videos of such ventures. This should be planned earlier.

Ask learners to visit these places or watch the videos. Ask them to observe critically and identify the raw materials used in the various industries.



From the video you showed to the learners you can tell them to check and see if they are able to identify the following:

- Gari industry: cassava
- Kenkey industry: maize,
- shea butter industry: Shea nut
- cooking oil industry: palm fruit, palm kernel, copra
- blacksmith industry: metals
- basketry industry: palm frond, raffia
- Carpentry industry: wood, nails
- Pottery industry: clay

Guide learners to match some local products with their raw materials.

**Project:** *Designing an Industry.* Ask learners to plan and design a factory in their locality and show the raw materials that are used and the finished products.

### Summary

- Science and technology have great impact in society.
- Every industry uses some materials to make their products.
- The materials that are used to make such products are the raw materials

### Diagnostic Assessment

Name a local industry the uses the following materials:

- a. clay
- b. sand
- c. wheat

### Answers to Diagnostic Assessment

- a. clay= pottery
- b. sand= block factory
- c. wheat= flour industry or bakery industry

### Progressive Assessment

The following raw materials are produced in your community: Plantain, millet, coconut, orange. For each one of them identify an industry that can be established there

### Answers to Progressive Assessment

Plantain= Plantain chips industry

Millet= “Pito” industry

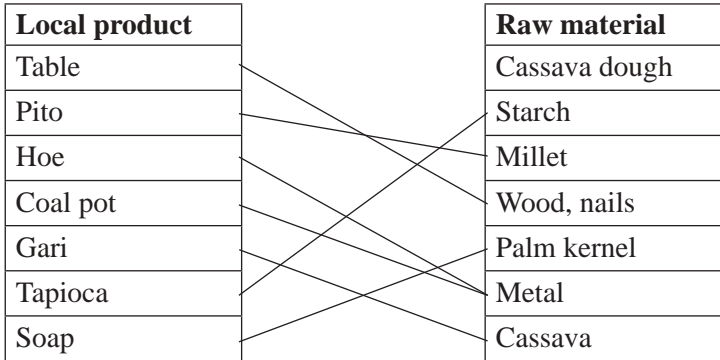
Coconut= coconut oil industry

Orange= orange juice industry



**Answers to Study Questions (Refer to LB page 201)**

1. Raw material is a basic material that is used to produce goods, finished products or intermediate materials.
2. Gari industry: cassava  
Kenkey industry: maize,  
cooking oil industry: palm fruit, palm kernel, copra
- 3.



4. For each of the following raw materials, write one (1) local industry that use it to produce their finished goods.
  - i. wood= Furniture
  - ii. Cassava= Gari industry
  - iii. palm nut=Oil industry
  - iv. maize = Kenkey industry

**Diagnostic assessment for facilitator**

1. Were you able to present the lesson in order?
2. Did you discuss diagnostic and progressive assessment meant for learners?
3. Were there more hands-on to make use of resources?
4. Did you make the effort to explore the locality where your school is located to find out some local industries before presenting the lesson?

## STRAND 5: HUMANS AND THE ENVIRONMENT

### SUB-STRAND 4: CLIMATE CHANGE

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#### LESSON 30: THE EFFECTS OF DEFORESTATION ON CLIMATE CHANGE

**Reference:** Learner's Book pages 202 - 209

##### **Expected Learning Outcomes**

- Analyse the impact of deforestation on the environment
- Identify the causes of deforestation
- Evaluate ideas on how to prevent deforestation

**Content Standard:** B5.5.4.1.1. Know that climate change is one of the most important environmental issues facing the world today.

**Indicator:** B5.4.1.1 Identify the impact of deforestation on climate change (should come before core competencies)

**Core Competencies:** Critical Thinking and Problem, Communication and Collaboration, Solving, Personal development and Leadership, Digital Literacy

**Subject Specific Practices:** Observing, Analysing, Evaluating

##### **Introduction**

Plants are living things and play a major role on earth. Green plants are the only living things that convert the energy from the sun into food for both plants and animals. Animals and plants breathe out carbon dioxide. In high concentrations, carbon dioxide can have a dangerous effect on living things. However, the green plants are able to absorb the carbon dioxide and use it to make their food on which animals also live. At the same time, the green plants produce oxygen which all living things use for respiration. Living things cannot survive when there is no oxygen for respiration. Green plants are therefore very important to life on earth. Without them there won't be life on earth.

**Key Words :** deforestation, indiscriminate, climate change, weather

##### **Additional Information**

Green plants help in several ways to sustain life on earth. Trees are green plants and therefore sustain life on earth. They manufacture food for themselves as well as for animals. They produce oxygen which is necessary for respiration. They absorb carbon dioxide which would have been toxic to living things in high concentrations. All these show the importance of green plants. Many trees found in the same area form a forest. It takes trees many years to grow and form a forest. Apart from the many good things trees do to sustain life on earth, they are also

used when we cut them to make furniture, burnt in the form of firewood and for roofing. They also protect the soil below them from erosion. Cutting trees therefore has serious effects on other living things on earth. In this lesson we shall learn about the effects of depleting forests on the climate.

**Materials and Resources (Low or no cost):** School environment, seedlings of trees

### **Starting the lesson**

Begins lesson by putting learners in their groups and ask them to discuss the importance of trees in their environment.

You can then lead the class for the discussion by asking learners to contribute to the importance of trees in the environment.

### **Activity 5.4.1.1 (b) Appreciation of importance of trees in the environment.**

Lead learners out of the classroom into the environment. Go under a tree with learners for the discussion.

The learners might mention the following things that plants do in the environment.

- Provide shade
- Provide food
- Provide fresh air
- Provide rain

Lead learners to elaborate on the provision of trees in the environment.

### **Summary**

- Trees are living organisms that provide shade, make food, provide fresh air and help in the production of rainfall.
- Without trees animals cannot live.
- Cutting down trees contributes strongly to climate change.
- As trees are cut down, storms become severe, there is shortage of food, and serious droughts occur.
- Instead of cutting down trees, we should actively plant trees to replace those that have already been cut down.
- We should use petroleum products instead of charcoal and firewood.
- There should be public education on protecting trees from being cut down, and the need to actively plant new trees to avert climate change.

Lead learners to brainstorm on the effects of cutting down trees on the environment. Learners discuss among themselves what trees do to sustain life on earth. Learners come out and discuss as a whole class activity.

### **Activity 5.4.1.1 (c) Ideas on the effect of tree felling on the environment**

If learners come out with what trees do to sustain life on earth, then they can also discuss the effects of felling trees on the environment.

Effects such as

- Shortage of food for animals
- Shortage of oxygen for plants and animals
- Absence of shade
- Reduced rainfall
- Strong winds

Lead learners to discuss what should be done to reduce tree cutting. Points such as

- Use of LPG for domestic cooking and heating instead of firewood.
- Use of plastic furniture
- Good farming practices
- Are to be considered.

#### **Activity 5.4.1.1 (d) Tree planting**

Distribute seedlings to groups and go out with them to plant trees in the environment. Advise them to keep watering the seedlings until they grow. They should be kept by fencing round them.

Supervise the activity.

#### **Assessment Questions**

1. Diagnostic
  - i. Name the gas plants use to make their food.
  - ii. Name the gas plants use to break down their food.
2. Progressive
  - i. List two things trees do to sustain the environment.
  - ii. State two reasons why trees are cut down.

#### **Answers to Assessment Questions**

1. Diagnostic
  - i. Carbon dioxide
  - ii. oxygen
2. Progressive
  - i. Help provide shade, provision of food, provision of fresh air, provision of rain.
  - ii. They are used to make furniture and for fuel.

#### **Answers to Study Questions (Refer to LB page 208 - 209)**

1.
  - i. A
  - ii. Bush burning, trees felling, drought,
  - iii. There will be enough rainfall, their crops will grow well, the air will be fresh
  - iv. Plant cover crops, stop bush burning, practice afforestation.
- 2.

- Tree planting will reduce heat
- It will make rain fall
- It will make crops grow well for food and other materials

3.

S/N	Causes	Effects	Prevention
1	Bush burning	Makes land bare	Stop bush burning
2	Cutting down trees	Makes weather warm	Plant new trees

**Diagnostic assessment for facilitator**

1. Did every learner realise the importance of environmental issues facing Ghana?
2. Did the learners realise they can also contribute positively or negatively to climate change?
3. Did the learners show curiosity to know more about issues of climate change?

# APPENDIX

## ANSWERS TO WORKBOOK

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### STRAND 1 : DIVERSITY OF MATTER

#### SUB-STRAND 1: LIVING AND NON-LIVING THINGS

#### LESSON 1: LIFE PROCESSES OF LIVING THINGS (Refer to Workbook Pages 2 - 5)

##### B5.1.1.1 Know the life processes of living things (growth, sensitivity to the environment, respiration and excretion)

#### PART A

---

1. b
2. c
3. d
4. a
5. a

#### PART B

---

1.
  - i. The tongue is an excretory organ. True[ ] False[]
  - ii. The nose is a sense organ. True[] False[ ]
  - iii. Carbon dioxide is an excretory product. True[] False[ ]
  - iv. Plants have special sense organ which makes the respond to changes in their environment. True[ ] False[]
  - v. During respiration plants breathe in oxygen and breathe out carbon dioxide. True[] False[ ]
2. Respiration, Growth, Excretion, Sensitivity
- 3.

Life process	Differences	
	Plant	Animal
Growth	fast	Slow
Respiration	slow	fast
Sensitivity	Slow	Fast
Excretion	Has no excretory organ	Has excretory organ

4.
  - i. cannot undergo any life processes: tin fish, kofi, sardine
  - ii. go through the same life process: Cat, okro, cassava, mosquito, monkey, mango, lizard, tilapia, salmon, cricket, pineapple,
  - iii. do not have excretory organ: okro, cassava, mango
  - iv. can respond faster to changes in the environment: Cat, mosquito, monkey, lizard, tilapia, salmon, cricket
5.
  - i. water vapour: lungs
  - ii. urine: kidney.
  - iii. carbon dioxide: lungs
  - iv. bile: liver

**LESSON 2: LIVING THINGS, NON-LIVING THINGS AND DEAD THINGS** (Refer to Workbook Pages 6 - 9)

**B5.1.1.2.1 Compare the differences among things that are living, dead and things that have never been alive.**

**PART A**

---

1. a
2. c
3. a
4. a
5. b

**PART B**

---

1.
  - a. Exercise books are made from living things but pencils are not. True[ ] False [ ✓ ]
  - b. Fishes do not breathe but birds do. True[ ] False [ ✓ ]
  - c. Plastic and plywood were once part of a living thing. True[ ] False [ ✓ ]
  - d. A tuber of yam can breathe but a tuber of cassava cannot. True[ ✓ ] False [ ]
  - e. Reproduction in mammals involves two individuals but not in fishes . True[ ] False [ ✓ ]
2. pencil, bible, boxes, handkerchief.
3. Three differences between a kite and a bird, in terms of life processes.

<b>Bird</b>	<b>Kite</b>
Can reproduce	Cannot reproduce
Can excrete	Cannot excrete

Can feed	Cannot feed
Can feel	Cannot feel
Can respire	Cannot respire

4.

Source of singing: parrot	Source of music: radio
It can respire	It cannot respire
It can feel	It cannot feel
It can reproduce	It cannot reproduce
It can feed	It cannot feed

Any 2

5.

- i. Bamboo tree can respire but bamboo chair cannot
- ii. Bamboo tree can feel but bamboo chair cannot
- iii. Bamboo tree can reproduce but bamboo chair cannot
- iv. Bamboo tree can feed but bamboo chair cannot

Any 2

## **STRAND 1 : DIVERSITY OF MATTER**

### **SUB-STRAND 2: MATERIALS**

**LESSON 3: CLASSIFYING MATERIALS BASED ON THEIR PROPERTIES** (Refer to Workbook Pages 10 - 12)

**B5.1.2.1.1 Classify everyday materials based on their properties (soft, hard, rough, smooth, opaque, transparent and bendable)**

#### **PART A**

---

1. c
2. d
3. b
4. c
5. a



## PART B

---

1.
  - i. Computer screen= transparent
  - ii. Louvre blade= translucent / transparent
  - iii. Plywood= hard
  - iv. Sheet of paper: opaque
  - v. Candle= soft.
2.
  - i. Plastics are used to make drinking cups because plastics are (water-proof/ transparent)
  - ii. Iron rods are used to build houses because they are ( rigid/ strong)
  - iii. The screen of smart phones are made of glass which is ( transparent/ flexible)
  - iv. Flower pots can be made of clay because wet clay is (sticky/ flexible)
3.
  - i. cooking pans = metal
  - ii. Tables = wood, metal, plastic.
  - iii. Cutlery = metal.
  - iv. High tension electric cable = metal

**LESSON 4: REVERSIBLE AND IRREVERSIBLE CHANGES** (Refer to Workbook Pages 13 - 14)

**B5.1.2.2.1 Know that some changes are reversible, while others cannot be reversed.**

## PART A

---

1. c
2. d
3. b
4. b
5. d

## PART B

---

1.
  - a. A=brown.
  - b. B = shiny
  - c. A = irreversible change
  - d. B = no change

2.
  - i. Ice cubes to water is reversible change
  - ii. .water to vapour is reversible change
  - iii. Wood to ash is irreversible change
  - iv. Wood to charcoal is irreversible change
  - v. Charcoal to ash is irreversible change
  - vi. Nails to rust is irreversible change
3.
  - i. a woman is cooking banku: water changing to vapour= reversible, burning of fuel= irreversible
  - ii. a vehicle is in motion: water changing into vapour in the radiator= reversible change, fuel burning= irreversible
  - iii. putting fish in the deep freezer: water changing into ice= reversible change,
  - iv. burning gunpowder: irreversible change..
  - v. lighting fire crackers at Christmas: irreversible change.

**LESSON 5: SOLID-LIQUID AND LIQUID-LIQUID MIXTURES** (Refer to Workbook Pages 17 - 22)

**B5.1.2.3.1 Demonstrate formation and separation of mixtures (solid-liquid and liquid-liquid mixtures)**

**PART A**

---

1. c
2. c
3. c
4. a
5. c

**PART B**

---

1.
  - i. Liquid-liquid mixtures can be separated by filtration. True[ ] False []
  - ii. All solid-solid mixtures can be separated by magnetization True[ ] False []
  - iii. Distillation apparatus cannot be used to separate oil and water True[] False [ ]
  - iv. Fanta and gari are solid-liquid mixtures True[] False [ ]
  - v. Seawater is a liquid-liquid mixture True[ ] False []
2.
  - i. Iron filings and sand are separated by use of a magnet
  - ii. Sand and water are separated by filtration

- iii. Salt and water are separated by evaporation
  - iv. Rice and water are separated by decanting
- 3.
- i. ethanol and water, =liquid-liquid mixture
  - ii. saw dust and water= solid-liquid mixture
  - iii. sugar solution= solid-liquid mixture
  - iv. rice and maize= solid-solid mixture
  - v. cooking oil and water= liquid-liquid mixture
- 4.
- i. A= gari/ corn flour/ sand/ powder  
B= iron filings
  - ii. Name the method used in D = magnetisation.
  - iii. A and B are combined to form C
  - iv. Components of C are being separated in D to become A and B
5. (a)
- i. Evaporation.
  - ii. salt and water.
  - iii. Salt industry.
- (b) Distillation  
A= alcohol, B= water

## STRAND 2 : CYCLES

### SUB-STRAND 1: EARTH SCIENCE

#### LESSON 6: HOW DAY AND NIGHT ARE FORMED (Refer to Workbook Pages 24 - 27)

##### B5.2.1.1.1 Know how day and night are formed

###### PART A

---

- 1. c
- 2. b
- 3. a
- 4. c
- 5. a

###### PART B

---

- 1. When a globe is rotated, at any particular time, you will only see **one side** of the globe.
- 2. The earth rotates round an imaginary line through its center called **axis**
- 3. Without the sun's light on earth, the earth will be **dark**
- 4. True

5. False
6. False
7. True
8. The rotation of the earth on its axis such that the side facing the sun is the day and the other side night.
9. 24 hours
- 10.



## LESSON 7: BENEFITS OF THE SUN (Refer to Workbook Pages 28 - 31)

### B5. 2.1.2.1 Describe the benefits of the sun to the earth.

#### PART A

---

1. c
2. b
3. b
4. a
5. b

#### PART B

---

1. The sun provides warmth and light to the earth (anyone)
2. Sun
3. Photosynthesis
4. Wind
5. False
6. True
7. True
8. droplets, cloud energy
9. a. earth b. cloud c. light
- 10.



plant grown in sunlight  
The broad leaves  
Leaves are green  
Plants grow taller



plant grown in a dark cupboard  
Leaves shrunk  
Leaves turn yellow/brown  
Plant could not grow well

## LESSON 8: THE WATER CYCLE (Refer to Workbook Pages 32 - 35)

### B5.2.1.3.1 Demonstrate evaporation and condensation as important processes of the hydrological (water) cycle.

#### PART A

---

1. a
2. b
3. b
4. b
5. b

#### PART B

---

1. Transpiration
2. evaporation
3. water cycle
4. a. Evaporated  
b. Evaporated
5. a. It will evaporate  
Reason: its volume will decrease.  
b The volume will remain the same  
Reason: These will be no evaporation  
c. Heat because it cause water to evaporate.  
d. After a rainfall when the sun shives, water evaporates from the ground. If the weather is cold water does not evaporate.

**LESSON 9: HOW CLOUDS ARE FORMED** (Refer to Workbook Pages 36 - 40)

**B5.2.1.3.2 Know how clouds are formed**

**PART A**

---

1. d
2. d
3. b
4. b
5. b

**PART B**

---

1. a. Rain will fall.  
b. No rain will fall.
2. Accept any appropriate drawing from learner.
3. a. They are thin, light clouds  
b. During a thundestorm
4. i. Condensed water vapour  
ii. dust particles  
iii. water droplets
5. a. nimbus  
b. cumulus  
c. cirrus  
d. stratus

**LESSON 10: USES OF CARBON DIOXIDE AND ITS EFFECTS ON HUMANS AND LIFE ON EARTH** (Refer to Workbook Pages 41 - 44)

**B5.2.1.4.1 Describe the uses of carbon dioxide and its effects on humans and life on earth.**

**PART A**

---

1. b
2. d
3. c
4. b

## PART B

---

1. a. Flooding  
b. Global warming leading to melting of ice of the poles  
c. Carbon dioxide  
d. i) respiration  
ii) burning of fossil fuel  
iii) decay of organisms
2. i. Plants      ii. Animals      iii. Fuels
3. i. breathing will become difficult  
ii. The globe becomes warmer
4. a. high temperature of the atmosphere  
b. Increase in carbon dioxide levels  
c. ice to melt at the poles leading to flooding  
d. reducing bush fire planting more trees, reducing the use of fossil fuel.

## LESSON 11: HOW WATER GETS POLLUTED (Refer to Workbook Pages 45 - 48)

### B5.2.1.5.1 Identify human activities that make water unsuitable for human use.

## PART A

---

1. c
2. b
3. d
4. c
5. c

## PART B

---

1. Has taste, has colour, has odour
- 2.

Pipe borne waer	Sea water	Rain water	Water from fish pond	Run-off water after rainfall
colourless	blue in colour	colourless	colourless	colourless
tasteless	salty taste	contains particles	has taste	has taste
odourless	smells of rotten material	has smell	smells of rotten material	smells of rotten material

3.
  - i. pipe borne water
  - ii. river water/pipe borne water
  - iii. river water
  - iv. river water/rain water
  - v. pipe borne water
4.
  - i. farming
  - ii. Dyeing of cloth
  - iii. Mining
  - iv. washing of the hair

**LESSON 12: KEEPING THE AIR CLEAN** (Refer to Workbook Pages 49 - 51)

**B5.2.1.5.2. Know how to make and keep air clean in our environment.**

**PART A**

---

1. c
2. c
3. b
4. c
5. c

**PART B**

---

1. Dust, Exhaust gases, smoke from burning materials
2. water dusty areas with water, Plant more trees, Do not burn rubbish.
3. Dust, smoke, smoke
4. dust, smoke, carbon monoxide, carbon dioxide (any 3)



## **STRAND 2 : CYCLES**

### **SUB-STRAND 2: LIFE CYCLES OF ORGANISMS.**

**LESSON 13: FUNCTIONS OF THE PARTS OF A PLANT** (Refer to Workbook Pages 52 - 56)

**B5.2.2.1.1. Relate the structure of the parts of a plant (leaves, stem, root, flower) to the functions they perform.**

#### **PART A**

---

1. d
2. c
3. c
4. a
5. a
6. b

#### **PART B**

---

1.
  - i. F
  - ii. F
  - iii. T
  - iv. T
2.
  - i. reproduction
  - ii. photosynthesis
  - iii. holds the leaves
  - iv. absorbs water
3. Accept any appropriate drawing from the learners.
4.
  - a.
    - i) It absorbs water and minerals for the leaf to prepare food
    - ii) It anchors the plant in the soil and absorbs water and minerals which help the plant to grow well.
  - b.
    1.
      - i) F
      - ii) F
      - iii) T
      - iv) T
    2.
      - i) reproduction
      - ii) photosynthesis
      - iii) holds leaves
      - iv) absorb water

**LESSON 14: GERMINATION OF SEEDS** (Refer to Workbook Pages 57 - 60)

**B.5.2.2.1.2. Compare the differences in germination of bean and maize seeds.**

**PART A**

---

1. a
2. b
3. a
4. a
5. b

**PART B**

---

1. i) F ii) T iii) T iv) F v) F
2. Accept any appropriate drawing from learners
3. i. Soil  
ii. above soil  
iii. above soil
4. a. It comes above the soil and turns green  
b. It remain below in the soil.

**STRAND 2 : SYSTEMS**

**SUB-STRAND 1: THE HUMAN BODY SYSTEM**

**LESSON 15: THE RESPIRATORY SYSTEM OF HUMANS** (Refer to Workbook Pages 62 - 66)

**B.5.3.1.1.1. Know the parts of the respiratory system in humans**

**PART A**

---

1. c
2. d
3. a
4. a
5. c

## **PART B**

---

1. i. F    ii. T    iii. F    iv. F
2. i. Asthma    ii. Bronchitis  
b. Pharynx, larynx, Trachea (any 2)
3. a i) Nostil  
    ii) Nasal cavity  
    iii) Pharynx  
    iv) Larynx  
    v) Lungs  
    vi) diaphragm  
b. Respiration
4. Bronchi, trachen, lung, lungs

## **LESSON 16: THE PARTS OF THE SOLAR SYSTEM** (Refer to Workbook Pages 67 - 70)

### **B5.3.2.1.1 Identify the components of the solar system (sun, earth, moon, other planets, satellite)**

#### **PART A**

---

1. d
2. b
3. b
4. b
5. a

#### **PART B**

---

1. Sun, planets, satellites (any two)
2. orbit
3. Sun
4. planets
5. False
6. True
7. True
8. 365¼
9.
  - i. The people in the community sat outside and told tales about how a woman was swallowed by the moon.
  - ii. There was dancing at the market square every night that the moon was seen.

10. rain, low, dry, high, water

11.



**STRAND 2 : SYSTEMS**  
**SUB-STRAND 2: ECOSYSTEM**

**LESSON 17: ORGANISMS AND THEIR HABITATS** (Refer to Workbook Pages 71 - 75)

**B5.3.3.1.1 Know how various organisms are adapted to survive in their habitats**

**PART A**

---

1. c
2. c
3. d
4. d
5. b

**PART B**

---

1.
  - i. Frogs have gills which makes them live in water True [ ] False [].
  - ii. Plants in the grassland have shallow roots True [] False [ ].
  - iii. Rabbit can be found in the desert True [ ] False [].
  - iv. Desert plants have deep root system True [  ] False [ ].
  - v. Because a shark is an aquatic animal, it can live successfully in the Volta lake True [ ] False [].
2. .

- i. A fish lives in a river/lake/pond
  - ii. frog lives in a= pond/lake/ land.
  - iii. A camel lives in the= desert
  - iv. An antelope lives in the= grassland
3. (a)

Habitat	Organism	Adaptation
Desert	Camel	Has lungs to breathe and legs to walk
Pond	Fish	Has gills to breathe and fins to swim
Forest	Monkey	Has lungs to breathe and hands and legs to climb trees
Grassland	antelope	Has lungs to breathe and legs to walk

- (b)
- Parrot= trees/forest
  - Monkey= trees/forest
  - Gorilla= forest/trees
  - black bear= forest
  - Tilapia=pond/lake/river.
  - mud fish=pond/lake.
  - Lion=grassland
  - Rabbit=grassland.....
  - Cactus= desert and other dry areas
  - Scorpion= forest/grassland/deserts
  - Dolphin= sea.....

- 4.
- i. Sea: lung fish, mud fish, toad, whale
  - ii. Desert: camel, monkey, elephant, frog
  - iii. River: salmon, cart fish, herring, whale
  - iv. Forest: Donkey, monkey, baobab tree
  - v. Grassland: rat, rabbit, tiger, camel

**STRAND 4: FORCES AND ENERGY**

**SUB-STRAND 1: SOURCES AND FORMS OF ENERGY**

**LESSON 18: ENERGY TRANSFORMATION (Refer to Workbook Pages 77 - 80)**

**B5. 4.1.1.1. Explain how energy is transformed from one form to another.**

**PART A**

---

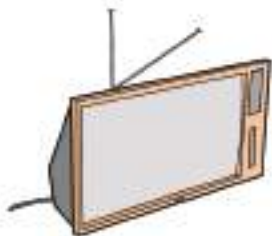
- 1. d
- 2. c
- 3. c

4. d
5. c

## **PART B**

---

1. do work
2. move
3. electrical
4. The mains and generator
5. True
6. True
7. False
8.
  - a. Light energy
  - b. Heat energy
  - c. Potential energy
  - d. Sound energy
  - e. Electrical energy
  - f. Kinetic energy
- 9.



- b. Electrical to light
10. Sun

## **LESSON 19: USING ELECTRICITY EFFICIENTLY** (Refer to Workbook Pages 81 - 84)

### **B5. 4.1.1.2 Know how to use electricity efficiently in the home.**

## **PART A**

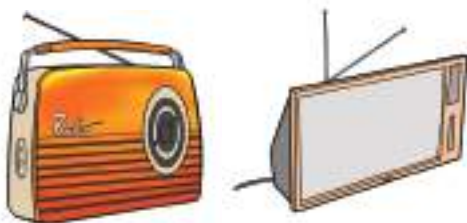
---

1. b
2. b
3. b
4. d
5. b

## PART B

---

1.
  - i. Deep freezer
  - ii. Television
  - iii. Electric pressing iron (Any other electric appliance)
2.
  - i. They should not become too hot
  - ii. Electrical energy should not be wasted
  - iii. Can result in fire outbreak
3. True
4. False
5. True
6. False
7.
  - i. Put off lights when not in use
  - ii. Iron in bulk and not one by one
8. electrical, heat
9. Electricity mains
10. wisely
- 11.



12. Use depends in the gadget drawn

## LESSON 20: HEAT AND TEMPERATURE (Refer to Workbook Pages 85 - 88)

### B5. 4.1.2.1 Show the relationship between heat and temperature.

#### PART A

---

1. c
2. a
3. a
4. c
5. a

## **PART B**

---

1. False
2. False
3. True
4. False
5. cold
6. hot, cold
7. feel
8. reduces, decreases
9. higher, colder
10. hot gains
11. temperature
12. The more heat a body acquires the higher its temperature
13.
  - i. Removing heat from a body
  - ii. leads to a decrease in its temperature

**LESSON 21: USING A THERMOMETER TO MEASURE TEMPERATURE** (Refer to Workbook Pages 89 - 93)

### **B5. 4.1.2.2 Measure and record temperature using a thermometer**

#### **PART A**

---

1. b
2. d
3. b
4. a
5. b

#### **PART B**

---

1. kink, liquid, degree, alcohol
2. False
3. True
4. False
5. True
6. False
7. two
8. hospital



9. 37°C
10. 110°C
11. germs
12. They are made of glass and can easily break if not handled carefully.
13.
  - i. In the science laboratory
  - ii. At a health facility
14.
  - i. The kink prevents the mercury from running down quickly into the bulb when temperatures are taken
  - ii. This enables accurate temperature to be read.
15. To return the mercury into the bulb for new temperature to be read.
16.
  - i. Clinical thermometer has a kink but a laboratory thermometer has no kink.
  - ii. Clinical thermometer has a short range but laboratory thermometer has a wide range.
- 17.



18. The degree of hotness of a body.

## **STRAND 4: FORCES AND ENERGY**

### **SUB-STRAND 2: ELECTRONICS**

**LESSON 22: THE PARTS OF AN ELECTRIC CIRCUIT AND THEIR USES** (Refer to Workbook Pages 94 - 98)

**B5. 4.2.1.1. Identify the components of an electric circuit and their functions.**




#### **PART A**

---

1. d
2. a
3. a
4. a
5. b

## PART B

---

1. True
2. True
3. False
4. True
5. True
6. Plug, symbols, circuit, socket
7. electrical
8. symbols
9. light energy
10. good
11.
  - i. Cell or battery
  - ii. resistor or load
  - iii. switch
12. An electric circuit is an arrangement of electrical components using circuit symbols to show how electric current flows through them.
13.
  - a. a cell 
  - b. a switch 
  - c. lamp 
14. cell, a switch and lamp

## STRAND 4: FORCES AND ENERGY

### SUB-STRAND 3: FORCES AND MOVEMENT

#### LESSON 23: FRICTION AND ITS EFFECTS (Refer to Workbook Pages 99 - 102)

##### B5. 4.3.1.1. Explain the term “friction”, its effects and application.

## PART A

---

1. d
2. c
3. b
4. a
5. b

## **PART B**

---

1. True
2. True
3. False
4. True
5. two
6. wet
7. A push or pull
8.
  - i. Causes heat to be generated
  - ii. Causes wear and tear of surfaces
  - iii. Causes people to fall easily when walking
  - iv. Enables people to walk
9.
  - i. Contact force
  - ii. Friction force
  - iii. Gravitational from (any 2)
10. Friction
11. A force that oppose the relative striking motion of two surfaces in contact.

## **STRAND 5: HUMANS AND THE ENVIRONMENT**

### **SUBSTRAND 1: PERSONAL HYGIENE AND SANITATION**

**LESSON 24: IMPORTANCE OF WASHING CLOTHES REGULARLY** (Refer to Workbook Pages 104 - 107)

**B5. 5.1.1.1. Know why it is important to wash clothes regularly.**

## **PART A**

---

1. a
2. a
3. c
4. b
5. a

## **PART B**

---

1.
  - i. False
  - ii. False
  - iii. False
  - iv. True
  - v. True
2.
  - Use the soap or detergent to form soapy water in the bucket of water
  - If your cloth is white or very dirty, you may have to soak it in a foamy water for some hours .
  - Afterwards apply the soap directly to any stains or dirty spots in the clothes.
  - Rub the fabric against itself to remove the stains.
  - Drain the soapy water from your clothes and rinse the garment in clean water to get rid of excess soap and detergent.
  - Let the clothes soak in the clean water for about 10 minutes to remove the soap with ease.
  - Squeeze and ring out the water with your hands, removing as much water as you can.
  - Hung the clothes on a drying line or on a neat floor or grass for it to dry
3. Soap, water, bucket/bowl

**LESSON 25: KEEPING OUR WASHROOMS CLEAN** (Refer to Workbook Pages 108 - 112)

### **B5.5.1.2.1 Know how to keep washrooms clean**

#### **PART A**

---

1. c
2. a
3. b
4. b
5. a

## PART B

---

1.
  - i. mop= Hold the handle and rub the other end on the floor to absorb the liquid on the floor
  - ii. Wear it on the hand and hold the tool with it and use the tool to clean the toilet.
  - iii. Hold the handle of the brush and use it to scrub the water closet or any part of the toilet
  - iv. Dilute a recommended quantity with water and pour some in the water closet, sprinkle some on the floor and clean the floor with a mop
2.
  - i. It should be kept dry to prevent people from slipping and falling. It also prevents germs from multiplying there.
  - ii. It should be burnt to destroy germs that cause disease
  - iii. Disinfectants is rather better than perfume because it kills germs that cause disease
3.
  - a. nice: mop, disinfectant, air refresher, source of running water(any 2)
  - b. bad: used tissue, water on the floor, pieces of paper
4. Accept any appropriate drawing  
Note: Facilitator to use his discretion to mark
  - ii. Note: Facilitator to use his discretion to mark

## LESSON 26: KEEPING THE ENVIRONMENT CLEAN (Refer to Workbook Pages 113 - 116)

### B5.5.1.2.2 Demonstrate how to clean the environment regularly.

## PART A

---

1. d
2. d
3. b
4. c
5. c

## PART B

---

1.
  - i. Throwing of rubbish into gutters [✓ ]
  - ii. Throwing of rubbish on the bare floor instead of putting them into dustbins [✓ ]
  - iii. sweeping our homes, schools and communities regularly[ ]

- iv. Absence of communal labour to desilt gutters and weed bushy areas within the community [  ]
  - v. Emptying dustbins into rubbish dumps when they become full [  ]
2. brooms, dustpans, rags , ceiling brush, dustbins (any 3 or any other correct 3)
- 3.
- i. Sweeping is gathering and cleaning rubbish on the floor.
  - ii. Moping is used to clean liquid on the floor.
  - iii. Raking is used to gather rubbish together with a rake
4. You were to make a poster to bring to school the next day.
- (a) Identify, from the list below the writing which you think is the best to write on a poster
- i. Write things on the wall to make the environment attractive [  ]
  - ii. It is better to throw rubbish in the gutter than on the road [  ]
  - iii. Do not close the dustbin but leave open for people to put their rubbish inside [  ]
  - iv. A healthy body lives in a clean environment [  ]
  - v. Urinate only in the gutter and not everywhere [  ]
- (b)
- i. Write things on the wall to make the environment attractive [  ]: This will not make the environment clean
  - ii. It is better to throw rubbish in the gutter than on the road [  ]: Throwing rubbish in the gutter will choke the gutter and can cause flooding
  - iii. Do not close the dustbin but leave open for people to put their rubbish inside [  ]: Leaving the dustbin over will attract flies which can breed into the dustbin. The smell of the rubbish will also pollute the environment.
  - iv. Urinate only in the gutter and not everywhere [  ]: Urinating in the gutter also pollute the environment

**STRAND 5: HUMANS AND THE ENVIRONMENT**  
**SUBSTRAND 2: DISEASES**

**LESSON 27: CHICKEN POX DISEASE** (Refer to Workbook Pages 117 - 120)

**B5.5.2.1.1 Explain the causes, symptoms and control of chicken pox.**

**PART A**

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- 1. d
- 2. c
- 3. c
- 4. b
- 5. c

## PART B

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1.
  - a. rashes
  - b. chickenpox
  - c. virus .
  - d. feverish, aching muscles, loss of appetite, generally not feeling well, rashes, and red spots that develop in clusters
  - e. Persons who are infected with the chickenpox disease have to be isolated so that they do not spread the disease.
2.
  - i. To isolate himself or herself from people.
  - ii. To avoid using the same clothes with other people.
  - iii. To report to his or her parents to take him or her to the hospital or clinic.
  - iv. He or she should not drink any medicine or apply any cream on your own.
3. To avoid contact with the learners infected by the disease.  
To avoid using the same uniform or handkerchief with other learners.
4. If he or she is feeling feverish, aching muscles, loss of appetite, generally not feeling well, rashes on the skin and red spots that develop in clusters

### LESSON 28: CHOLERA (Refer to Workbook Pages 121 - 124)

#### B5.5.2.1.2 Identify causes, symptoms and prevention of cholera.

## PART A

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1. a
2. c
3. a
4. d
5. c

## PART B

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1. A person who has cholera suffers severe diarrhoea, vomits and suffers abdominal pains.  
Keeping good personal hygiene can help to prevent cholera.
2.
  - i. Cholera is spread by virus True[  ] False [  ]
  - ii. Cholera can be spread by wearing dirty under wears. True[  ] False [  ]
  - iii. People who suffer from cholera visit the washroom a lot. True [  ] False [  ]
  - iv. One of the ways you can prevent cholera is by bathing with clean hot water.

True [ ] False [ ✓ ]

- v. Cholera can be spread through the eating of contaminated food. True[✓] False [ ]
3. Underline the correct option
- cholera is caused by: virus/Bacteria/ dirt
  - you can prevent cholera by: eating cold food/washing hands with water/ covering food
  - You can spread cholera by: washing hands with soap and water/ covering food/ defaecating indiscriminately
4. Note: The facilitator to use his or her discretion to accept any appropriate drawing.

## **STRAND 5: HUMANS AND THE ENVIRONMENT**

### **SUBSTRAND 3: SCIENCE AND INDUSTRY**

**LESSON 29: RAW MATERIALS USED IN LOCAL INDUSTRIES** (Refer to Workbook Pages 125 - 128)

**B5.5.3.1.1 Identify the raw materials used in some local industries (kenkey production, gari production, ceramic and pottery production)**

#### **PART A**

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- a
- b
- b
- d
- a

#### **PART B**

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- Science and technology have great impact in society. Every industry uses some materials to make their products. The materials that are used to make such products are the raw materials.
- maize = Kenkey industry
  - Shea nut = cooking oil industry.
  - palm kernel = cooking oil industry
  - metals = blacksmith industry
  - palm frond = Basketry
  - nails = Carpentry workshop.
- (a)
  - millet = raw material
  - Pito = finished product



- iii. flower pot = finished product
- iv. wood = raw material .
- (b) i. millet= pito
- ii. Pito= millet
- iii. flower pot=clay.
- iv. wood= furniture

**STRAND 5: HUMANS AND THE ENVIRONMENT**  
**SUB-STRAND 4: CLIMATE CHANGE**

**LESSON 30: THE EFFECT OF DEFORESTATION ON CLIMATE CHANGE** (Refer to Workbook Pages 129 - 133)

**PART A**

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- 1. b
- 2. d
- 3. a
- 4. c
- 5. a

**PART B**

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- 1. Chemical
- 2. respiration
- 3. shortage
- 4. False
- 5. True
- 6. True
- 7. True
- 8. False
- 9. furniture, fire
- 10. famine
- 11. windbreaks, condensation
- 12. plastic
- 13. wind, freshness
- 14. so that they will not cut down trees to produce firewood.
- 15.
  - i. As windbreaks to move moisture laden air up to form clouds
  - ii. to provide shade for other living things
  - iii. to provide living places for organism (any 2)

16.
  - i. Increases carbon dioxide concentration in the atmosphere
  - ii. Causes greenhouse effect and climate change
  - iii. Reduces the chance of rainfall.
17. Accept any appropriate drawing from learners
18.
  - i. stop deforestation
  - ii. stop bush burning
  - iii. stop burning rubbish
  - iv. plant more trees
  - v. public education on tree planting etc.