NEW AGE SCIENCE

FOR BASIC SCHOOLS

TEACHER'S GUIDE BOOK

4

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 confirm 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 whiles 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 leaners 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.

CONTENTS

STRAND 1: DIVERSITY OF MATTER

SUB-STRAND 1: LIVING AND NON-LIVING THINGS

LESSON 1: CHARACTERISTICS OF DIFFERENT GROUPS OF ANIMALS

Reference: Learner's Book page 2

Expected Learning Outcomes

- Know the various groups of animals (insects, birds, mammals, amphibians and reptiles)
- Identify the physical characteristics of each group of animals
- Give examples of animals in each group

Content Standard: B4.1.1.1 Understand the physical features and life processes of living things and use this understanding to classify them

Indicators: B4.1.1.1.1-: Classify animals into insects, birds, mammals and reptiles

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

Subject Specific Practices: Observing, Analysing, Classifying, Generalising

Introduction

In Pupil's Book 1, we learnt about living things and non-living things. We learned that plants and animals are living things. The living things have certain physical features and they undergo certain life processes. The knowledge of these things will enable us clarify them. In Unit 1 of Pupil's Book 2 we learnt about plants. In this unit, we are going to learn about different animals and how to classify them.

Key Words: Amphibians, mammals, reptiles, birds, Insects, classify

Materials and Resources: Pictures or videos of animals – including insects, birds, mammals and reptiles.

Additional Information

The world can be divided into a number of different regions. Each region has its own characteristic plants and animals. All the plants and animal have become adapted to their own surroundings or environment and their lives are linked in a complex web of interdependence.

Physical features of these living things around us play significant role in classifying them. We are surrounded by living and non-livings things. Living things consists of plants and animals. Animals also consist of different groups. The knowledge of the physical features of these things

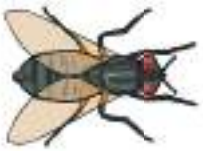
enables us to carry out these groupings. The leaners, having studied about living and non-living things, plants and animals need to know about certain physical features of animals that can be used to classify them.

Birds

guinea fowl

turkey

Insects



housefly

cockroach

Fishes

tilapia

herrings

Mammals

goat

human being

Amphibians

toad

tortoise

newt

Reptiles

snake

crocodile

Starting the lesson

In groups of four or five, discuss the drawings above.

Activity: 1.1.1.1: Observing and recording names of different kinds of animals

Materials/Resources (Low or no cost):

Procedure

- Leaners embark on a walk to observe and record names of different kinds of animals in their community or show videos and pictures of different kinds of animals to learners.
- Learners talk about the different animals based on their limbs, body, covering, height, shape size, where they live, how they move, what they eat.
- Provide flashcards of many different animals to learners in groups.
- Assist leaners to sort the pictures into insects, birds, mammals and reptiles and produce animal classification card and table.
- Leaners display and do presentation on their group work.
- Leaners to give reason for their classifications.
- Ask leaner to identify things which are common to all the different kinds of animals.
- Assist leaners to mould different kinds of animals using suitable materials such as blu tack, day, cardboard etc.)
- Leaners draw different kinds of animals (insects, birds' mammals and reptiles.)

Assessment Questions

1. Diagnostic
   i. Name three classes of animals
   ii. How will one identify an insect?

2. Progressive
   i. Name three parts of any animal's body
   ii. Do all animals move?

Answers to assessment questions

1. Diagnostic
   i. insects , birds , mammals, reptiles
   ii. An insect has three pairs of limbs

Progressive

i. Head , trunk, limbs
ii. Yes all animals move from place to place.

Answers to Study Questions. (Refer to LB pages 10 - 11)

1. Birds = vulture, weaver bird,
   Mammals= monkey, mouse
   Insects= dragon fly, butterfly,
   Reptiles= wall gecko
   Amphibians = toad
   Fish = Tilapia, salmon
2. .
   i. False
   ii. True

iii. True
iv. False
v. False

3. Match each group of animals with their appropriate characteristics

Group	**Characteristic**
Fish	Have thorax, head and abdomen
Amphibians	Produce milk for their babies
Mammals	Have fins to help them swim
Insects	Are able to fly because they have wings and feathers
Birds	Can live both in water and on the land
Reptiles	Cold-blooded animals which have scales on their skin

4.
   i. Birds= vulture, weaver bird, eagle, parrot, fowl, turkey(any 2 or any other 2 correct birds)
   ii. Mammals= Dog, mouse, goat, sheep, monkey(any 2 or any other 2 correct mammal)
   iii. Insects = mosquito, housefly, butterfly, tsetse fly, honey bee (any 2 or any other 2 correct insects)
   iv. Reptiles = snake, wall gecko, lizard, crocodile (any 2 or any other 2 correct reptile)
   v. Amphibians = toad, frog, salamanders(any 2 or any other 2 correct amphibians)

Diagnostic assessment for facilitator

1. Did you use some live animals for this lesson?
2. Were there some learners who could not classify animals into the various categories?
3. What did you do to help such learners?
4. At the end of the lesson were the learners able to give examples of the various categories of animals?

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

LESSON 2: LIFE PROCESSES OF ALL LIVING THINGS

Reference: Learner's Book pages 12 - 20

Expected Learning Outcomes
- Explain the term movement and describe how different animals move
- Explain how different animals give birth to their young ones
- Describe how animals get food.

Content Standard: B4.1.1.1 Understand the physical features and life processes of living things and use this understanding to classify them

Indicator: B4.1.1.1.2. Know life processes of animals (movement, nutrition and reproduction)

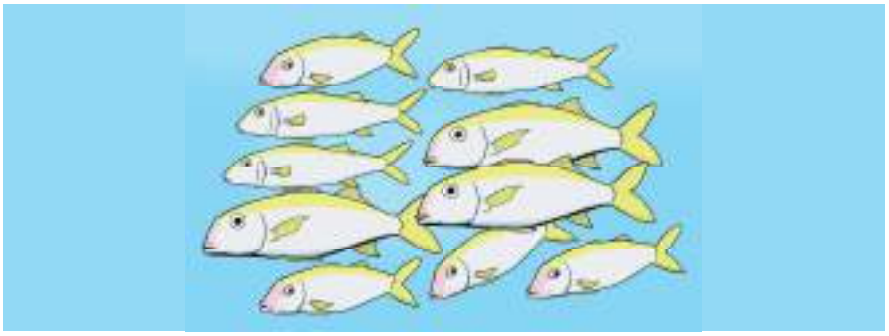
Core Competencies
- Digital Literacy
- Personal development and leadership
- Critical Thinking and Problem-Solving
- Communication and Collaboration
- Creativity and Innovation

Subject Specific Practices: Observing, Analysing, Classifying, Generalising

Introduction
Human beings are examples of living things. In basic 3 we learnt about how to classify living things as plants or animals based on their life processes. All living things undergo life processes such as eating, moving, making babies and growing bigger. We will learn more about some of these life processes.

Key Words: Nutrition, Movement, reproduction, omnivore, carnivore, herbivore

Additional Information
Movement of animals
Unlike plants, animals are able to move their whole body from one place to another. They move in search of other animals, food or shelter. Animals such as fish have fins for swimming.



Birds also have wings to help them fly from one tree to another.

Animals that live on the land show different forms of movement such as

- walking
- crawling
- running
- hopping
- galloping

The different groups of animals move differently because of shape of their bodies and where they live.

Animals show the following type of movement:

- •walking
- •flying
- •swimming
- •crawling
- •running
- •galloping

Copy the activity shown below into your exercise book.

List of animals	Type of movement
goat	Swimming
toad	crawling
fish	walking
bird	running
snake	hopping
rat	galloping
horse	flying

With arrows, match the list of animals with the type of movement they do.
An example has been done for you.

Reproduction in Animals

There are different ways of reproducing young ones (babies) in animals.
Some animals:

- lay eggs
- give birth to young ones alive

Animals that lay eggs to make babies are:

- Fishes – live in water and lay eggs in water.
- Amphibians (e.g. frogs) live partially in water and partially on land. They lay eggs close to water bodies and the fertilized eggs develop in water.
- Reptiles (crocodiles, snakes, lizard) lay eggs on land.
- Snails also lay eggs on land.
- Birds (chicken, guinea fowls, parrots, ostriches) lay eggs.

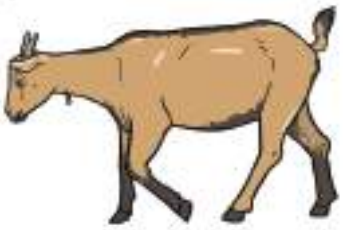
Bird

Insect

reptile

amphibian

fish



mammal

All the animals named above lay eggs to produce young ones.
Insects (cockroach, mosquito, housefly, tick) are also small animals that lay eggs to produce young ones.

Observe videos and pictures showing movement, nutrition and reproduction in animals.
Describe how (insects, birds, reptiles and mammals) move, feed and reproduce.

In your groups, role-play movement and nutrition of animals. Discuss the importance of movement, nutrition and reproduction to animals.

Animals that give birth to live young ones are called mammals.
Some examples of mammals are:

- humans
- dog
- horse
- cat
- cow
- pig
- rat
- whale
- rabbit
- bat

kangaroo

dog

pig

rabbit

- Learners observe videos and pictures depicting movement, nutrition and reproduction in animals
- Learners describe hoe various animal's insects, birds, reptiles and mammals move, feed and reproduce.
- Learners role-play or pantomime movement and nutrition of animals.
- In groups, learners discuss the importance of movement, nutrition and reproduction to animals.

NB: You should collect and preserve common animals for preservation.

Summary

- All animals undergo life processes such as nutrition, reproduction and movement
- All animals can move their whole bodies from one place to another
- Mammals are the only animals that give birth to their young ones alive
- Birds, insects, reptiles, amphibians and fish make babies by laying eggs
- Based on how they feed, animals are grouped as omnivores, carnivores or herbivores.

Diagnostic Assessment Questions

1. Animal can be classified into four main groups. True or False?
2. Write down the names of the four groups into which animals can be classified

Progressive Assessment Questions.

1. Plants show four main Physical appearances. True or False?
2. Write down the four main Physical appearance of plants.

Answer to diagnostic assessment questions

1. True.
2. The four groups are(i) insect, (ii) birds, (iii) birds(iv) mammals,

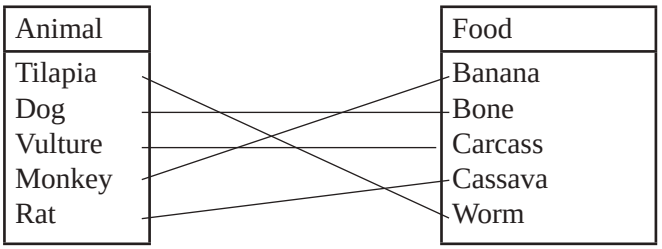
Answers to Progressive assessment questions.

1. True
2. The four main physical appearance of plants are:
   (i) tree, (ii) climbing (iii) Creeping plants.

Answers to Study Questions (Refer to LB pages 17 - 20)

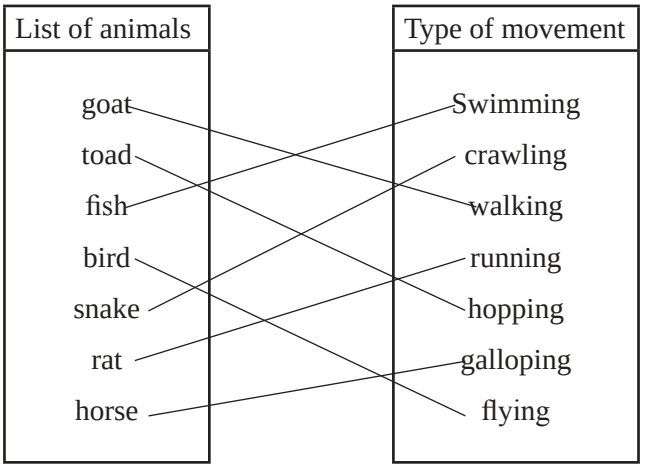
1. Unlike plants Animals are able to move their whole bodies. Different animals have structures that help them to do so. For Instance, fish have fins for swimming. Birds also have wings for flying.
2.
   a. giving birth to live babies = goat, dog, cat, cow (any 2 or any other 2 correct ones)
   b.laying eggs = lizard, fowl, snake

3.



4. i. Reproduction ii. Feeding iii. Movement

5.



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. After the lesson will you say that the learning expectations have been achieved?

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

LESSON 3: TYPES OF PLANTS

Reference: Learner's Book pages 21 - 26

Expected Learning Outcomes

- Know the different groups into which plants are placed
- Give examples each of erect, creeping and climbing plants
- Sort common plants into their appropriate groups as creeping, climbing or erect plants

Content Standard: B4.1.1.2 Understand the differences between living things and things which have never been alive

Indicators: B4.1.1.2.2. Describe the physical appearance of different types of plants (trees, shrubs, climbing, creeping)

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

Subject Specific Practices: Observing, Communicating, Manipulating,Creating

.

Key Words: Shrubs, Climbing, Creeping, erect

Introduction

We learnt that animals can be placed into different groups such as reptiles, mammals and amphibians. Can you recall the other groups of animals? Plants as living things are also placed into different groups. At the end of this unit, you will know more about the groups to which the plants around your home and school belong to.

Additional Information

We learnt that animals are living things. Plants are also living things. Plants can be erect, creeping or climbing.

climbling plant

a shrub

creeping plant

erect plant

Erect plants

These are plants which normally stand straight on their own. Their stems are upright to support the plant. There are many erect plants around us.

Examples include:

- Hibiscus flower plant
- Banana plant
- Mango tree
- Mahogany plant
- Odum plant

Creeping plant

These plants normally grow along the ground from their roots. They may grow other roots as they grow along. Their stems are not strong enough to make them stand upright like erect plants.

Examples of creeping plants are:

- sweet potatoes
- some kinds of grass
- watermelon

Climbing plants

These are plants with weak stems. They cannot stand on their own. They need to be supported. They grow around plants erect plants for support or they are supported by sticks placed near them to climb.

Examples of climbing plants:

- yam
- some type of bean plants

Starting the lesson

Start this lesson by taking learner through the activity below

Activity1.1.2.2: Going round school compound to observe the different kinds of plants.
Materials/Resources (Low or no cost):
Procedure
Lead learners in their groups of four or five in a group, to go out and walk round the school compound, and observe the different kinds of plants. Let them look out for the following types of plants:

a. erect plants
b. creeping plants
c. climbing plants

Also show to learners, videos and pictures of the types of plants and let them compare with those they have observed in the school compound.

In their groups let the learners discuss and describe the physical features of the plants they have observed – their structure and size.

In your groups, let the learners create a plant album of different types of plants – (shrubs, trees, climbing and creeping plants). Use their leaves and label them as such.

Summary

- Based on their structure, plants are as classified as erect, creeping, or climbing
- Erect plants are trees and shrubs that normally stand straight on their own
- Creeping plants are plants weak stems that move on the ground. Examples are sweet potato and water melon
- Climbing Plants are those that have weak stems and so depend on other plants for support. Yam is an example of a climbing plant.

Assessment questions

1. Diagnostic
   i. List three different types of plants as far as their stems are concerned.
   ii. All plants have one method of making their food. Explain the statement.

2. Progressive
Put the correct word in the gap in 2(i) and (ii)

i. Creeping plants have _____ stems (strong , weak)
ii. Shrubs have _____ stems (short, tall)

Answers to assessment questions
Diagnostic

i. Shrubs, erect, climbing, creeping
ii. They all have chlorophyll and photosynthesize to make food.

Progressive

i. Weak
ii. ii) Short

Answers to Study Questions (Refer to LB page 26)

1.
   i. False
   ii. True
   iii. True
   iv. False
   v. False
2.
   i. Orange
   ii. Water melon
   iii. Pawpaw
3. Use one word of the following words in bracket to describe the stem of the following plants(creeping, climbing, erect)
   i. Erect
   ii. Creeping
   iii. Climbing
   iv. Creeping

Diagnostic assessment for facilitator

1. In what ways did you engage the learners in critical thinking?
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?

LESSON 4: LIQUID-LIQUID MIXTURES AND THEIR SEPARATION

Reference: Learner's Book pages 27 - 33

Expected Learning Outcomes

- Know how liquid-liquid mixtures are formed
- Identify the types of liquid-liquid examples and mention examples of each
- Explain how a mixture of immiscible liquids can be separated

Content Standards: B4.1.2.2 Understand mixtures, their types, formation, uses and ways of separating them into their components

Indicators: B4.1.2.2.1: Identify a liquid-liquid mixture and describe how to separate its components

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

Subject Specific Practices: Observing, Analysing, Manipulating

Introduction

At this point the learner is able to describe the physical features of different types of animals such as mammals, reptiles, insects and amphibians. This will enable the learner separate a list of animals into these categories. This skill the learner has acquired can be extended to non-living materials. A mixture of materials can be separated into individual components if the learner knows their unique characteristics. In this indicator, the learner will be able to identify a liquid-liquid mixture and describe how to separate its components

Key Words: miscible, immiscible, distillation, separating funnel

Additional Information

Materials surrounding us are elements, compounds and mixtures, Mixtures are physical combination of two or more substances in which no new substance is formed. There are several types of mixtures. Some mixtures exist naturally. There are some mixtures which are formed by humans for use in daily life. The types of mixtures depend on the substances that combine to form the mixture. These include:

- Solid – solid: The substances that combine are all solids. Example, iron filing and sand
- Solid –liquid: One substance is a solid and the other one is a liquid. Example, sugar in

water
- Liquid –liquid: The two substances are liquids. Example, alcohol in water
- Liquid–gas: A liquid and a gas combine to form this mixture. Example, gas in coca cola
- Gas – gas: Two gases combine to form this type of mixture. Example, oxygen, nitrogen, and carbon dioxide in air
- Solid – gas: Solid particles suspended in a gas form this mixture. Example, dust particles in air

Note
- Vinegar in water: liquid– liquid mixture in which the vinegar dissolves in the water.
- Oil in water: Liquid – liquid mixture in which the oil does not dissolve but settles on the water because the oil is lighter than the water.

Uses of Mixtures

There are many uses of mixtures in everyday life. These uses include:
- Soaps production: Oil, salt, perfumes, water can be found in soap
- Alcoholic beverages production: Water, ethanol, carbon dioxide can be found in alcoholic beverages
- Soft drinks: Soft drinks contain water, sugar, carbon dioxide and some substances which can preserve it
- Medicines: Different substances are mixed to produce medicine. Antacids for example may contain a mixture of a weak acid and calcium carbonate
- Creams (body and hair)

Uses of mixtures in industry include:
- Manufacture of paints: Paints contain water and oil, and some chemicals that give them colour and some other chemicals that make them stick to surfaces during painting.
- Manufacture of medicines
- Crude oil: Petrol, diesel, paraffin, bitumen, LPG are found in crude oil
- Manufacture of soft drinks
- Manufacture of alcoholic beverages

Ways of Separation of Mixtures

Mixtures can be separated. There are certain methods which can be used. These methods depend on the type of mixtures. The following methods are used to separate different types of mixtures;
- Filtration: Solid particles in a liquid are separated.
- Evaporation: The mixture which contains a solid dissolved in a liquid is heated. The liquid evaporates leaving the solid behind.
- Magnetisation: This method can be used when there are small particles called iron filings in the mixture.
- Decantation: The mixture which consists of solid particles which settle at the bottom is separated by pouring out the liquid at the top.
- Winnowing: If a mixture consists of particles which are not heavy and those that are

heavy, they can be separated by blowing air through it so that the particles which are not heavy are blown away.

- Distillation: A mixture of two liquids such as water and ethanol can be separated by this method. In this case, the boiling points must be far apart. When the mixture is heated, the liquid which has a lower boiling point evaporates first. The vapour is made to condense into a liquid by cooling.
- Separation of two liquids which cannot mix (immiscible liquids) can, however, not be carried out by the above methods. It can only be done by using separating funnel.

Starting the lesson

Start this lesson by asking learners what they like eating during breakfast. If some of the learners mention tea, ask them how tea is prepared. Ask learners whether they use only water and break for breakfast. Ask learners how they will call a combination of water and sugar. Show to learners some liquids and tell them to identify them

cooking oil

water

milk

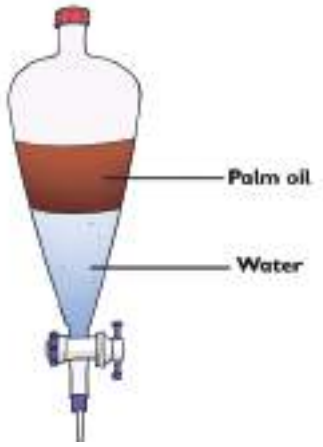
soft drinks

Activity 1.2.2.1(a): Observing and identifying different types of liquids
Materials/Resources (Low or no cost): water, kerosene, cooking oil, milk and soft drinks
Procedure

- Tell learners to organize themselves into groups of four or five.
- Give to each group of learners different kinds of liquids.
- Tell learners to
  i. mix any two of the liquids of the same kind.
  ii. mix any two of the liquids of different kinds.
- Tell learners to observe and record their findings, for example, vinegar and water, palm oil and water.
- Tell learners to describe the different types of liquid-liquid mixtures they observe.
- Ask learners which of the liquids are
  i. able to mix uniformly (miscible liquids)
  ii. not able to mix uniformly (immiscible)?

Activity 1.2.2.1(b): To demonstrate how to separate a mixture of palm oil and water.
Materials/Resources (Low or no cost): Palm oil, water, separating funnel (or any improvised separating funnel), beaker(or any container).
Procedure

- Tell learners to organize themselves in groups of four or five.
- Give to learners the following materials: palm oil, water, separating funnel (or any improvised separating funnel), beaker(or any container).
- Tell learners to pour the water and the oil in a beaker and stir the mixture vigorously.
- Tell learners to pour the mixture into the separating funnel.
- Tell learners to position a beaker or any container under the separating funnel.
- Tell learners to wait for about five minutes to make sure the oil has separated from the water.
- Tell learners to open the tap of the separating funnel and allow the denser liquid at the bottom to flow gently.
- Tell learners to close the tap immediately all the denser liquid at the bottom flows out.
- Tell learners to put the denser liquid aside and put another beaker or container under the separating funnel again.
- Tell learners to open the tap and allow the lighter liquid to flow.
- Tell learners to discuss the activity with their group members.



Project: *Investigate how to separate a mixture of immiscible liquids such as cooking oil and water.*

Note: The activity in this project can be undertaken with the aid of a separating funnel or an improvised version of it. You can do this by opening the bottom of pure water bottle by cutting it with knife. Make a small hole in the cover of the bottle. Turn the bottle upside down. You can then use your finger to close or open the bottle to let the liquid poured in it to flow out or stop it from flowing out. Do not use liquids that are flammable or poisonous. Guide learners to do the project.

Summary

- Mixtures are physical combination of two or more substances in which no new substance is formed.
- Liquid-liquid mixtures are formed when two different liquids are mixed together.
- When two different liquids mix to form a uniform mixture, they are called miscible liquids. An example is a mixture of water and alcohol
- Immiscible liquids are liquids that cannot mix to form a mixture having one uniform colour. Palm oil and water are two immiscible liquids
- Separation of two liquids, which cannot mix (immiscible liquids), can be carried out by using separating funnel.

Diagnostic Assessment

1. You can only form a mixture by combining more than two things. True or false
2. In forming a mixture no new things are produced. True or false
3. Water is a mixture. True or false

Progressive Assessment

1. Mention two things that can be used to separating coconut oil and water
2. Is salt solution a liquid-liquid mixture? Why?

Answers to Diagnostic Assessment

1. False
2. True
3. False

Answers to Progressive Assessment

1. Separating funnel and a beaker
2. No. The reason is that water is liquid but salt is solid

Answers to Study Questions (Refer to LB page 33)

1. Water and petrol, water and groundnut oil, petrol and groundnut oil.
2. Palm oil in coconut oil, ethanol in water
3. (i) Liquid-liquid mixture
   (ii) They are immiscible
   (iii)

 Separating funnel	 Beaker

4. (a). Miscible: Ethanol and water, palm wine and water
   Immiscible: Water and palm oil, water and kerosene
   (b) Miscible: Ethanol and water, palm wine and water = distillation
   Immiscible: Water and palm oil, water and kerosene = separating funnel
   i.

Diagnostic assessment for facilitator

1. How did you arouse the interest of the learners for the lesson?
2. Did you tell the learners the relevance of the lesson to daily life?
3. Were the learners able to demonstrate good skills in identifying, grouping things and classifying them?
4. Did the pedagogy you used help you present the lesson?

STRAND 2: CYCLES

SUB-STRAND 1: EARTH SCIENCE

LESSON 5: CYCLIC MOVEMENTS IN THE ENVIRONMENT

Reference: Learner's Book pages 35 - 39

Expected Learning Outcomes

- Explain cyclic movements
- Give examples of devices that exhibit cyclic movement
- Describe cyclic events within the community

Content Standard: Recognise that some events in our environment occur recurrently

Indicator: B4.2.1.1.1 Demonstrate understanding of cyclic movements in the environment

Core Competencies: Critical thinking and problem-solving communication and collaboration

Subject Specific Practices: Observing, Generalizing Analysing, Communicating Reporting

Introduction

Natural processes occur in our everyday life. These events come repeated. They are said to occur in cycles. For an example, there are seven days in a week but they come repeatedly hence they are said to be in cycles. Other events that occur in cycle include seasons, swinging of the arm, merry-go-round, and movement of the arm during walking among many others.
The simple pendulum is another example of a cyclic movement. This kind of movement is called simple harmonic movement and the activity being carried out is the simple pendulum. Simple pendulum can be found in clocks.

Key Words: cyclic, swinging, pendulum, analogue, merry-go-round.

Additional Information

A cyclic movement is a movement that starts from a particular spot and goes round and come back to the original spot from where the movement starts. This movement can continue without ending if nothing stops it. We have quite a number of such movements in our environment.

Staring the lesson

You can start this lesson by engaging the learners in the following activities:

Activity 2.1.1.1 (a) to build and use a simple pendulum
Materials and resources (low and no cost): Stone or ball, a piece of string about 50 cm.
Procedure

- Put learners in groups of four or five. Begin lesson by asking learners give examples of some processes that occur in cycle. Learners will give examples such as merry-g-round, clock, etc. Lead learners to brainstorm to come with one thing that is common to all the cyclic movements.
- Guide learners to tie the string to the stone or ball. Let one member of the group holds the string up and the ball or stone down as shown in the diagram.

Activity 2.1.1.1 (b) Demonstrating cyclic movement
Procedure
Lead the class by asking learners what they think will happen if the stone is displace from a fixed point of the end of the rope. Learners discuss the kind of movement the ball will be making. Explain to learners, this is one example of a cyclic movement.

Put learners in groups. Ask one member of the group to displace the stone or ball to the side and allow it to swing. Learners count twenty swings together in their group.
Illustration. Diagram of a girl holding the simple pendulum displaced to the side.

Activity 2.1.1.1 (c) Movement of the second hand of an analogue clock
Materials and resources (low and no cost): Analogue clocks, charts of clocks showing different times.

Procedure
Ask learners to observe the movements of the various hands of the clock. Ask learners to describe the movement of the second, minute and hour hands. Learners discuss in group to conclude that this movement is an example of a cycle.

Explain to learners that day and night as well as years and seasons are other examples of cycle.

Activity 2.1.1.1 (d) movement of a merry-go-round
Materials and resources (low and no cost): Merry-go-round (you can arrange for merry-go-round from a nearby school if your school does not have one.
Procedure
Lead learners to discuss in group what happens when the merry-go-round is displaced off its position. Let learners discuss what they observe and ask them how it moves. Let them give examples of other similar movements.

Activity 2.1.1.1 (e) Movement of the limbs and during walking
Materials and resources (low and no cost): Chart illustrating the movement of a boy and a girl, and a video of school children marching at assembly or an Independence Day celebration. Lead discussion on the movement of the limbs as the children walk or March. Ask learners what happens to the limbs of the children as they walk or March. Learners will come out with the understanding that the limbs move in simple cyclic forms.

Ask questions such as;
How do the limbs move? Do they move in a repeated form?
All the activities performed point to one thing. They all show that most movements are cyclic in nature. They repeat themselves. The swinging pendulum, the second hand of an analogue clock, the merry-go-round and the movement of the limbs as one walks along are examples. In nature, there are so many of these cyclic movements. The moon and the earth are other examples of cyclic movement.

Summary
- Cyclic movements are common in nature and also in human activities.
- The movements repeat themselves.
- The pendulum swings and repeats itself.
- The second hand of an analogue clock goes round in a cyclic manner.
- The merry-go-round moves in a cyclic manner.
- The limbs of humans repeat themselves as we walk along. In the environment, plants such as maize also go through a cyclic movement.

Assessment questions.

1. Diagnostic
    i. A cyclic movement is …….
    ii. The movement of the simple pendulum is referred to as a cyclic movement because …….

2. Progressive
    i. Give two examples of cyclic movement you can observe in school
    ii. The sun shows a cyclic movement, true or false?

Answers to assessment questions.

1. diagnostic
    i. A cyclic movement is a movement which occurs in a repeated pattern.
    ii. The movement of the simple pendulum is referred to as a cyclic movement because it moves to and fro in a repeated pattern.
2. Progressive.
    i. The analogue clock, the simple pendulum, merry-go-round, the movement of the earth round the sun, etc.
    ii. True.

Answers to Study Questions (Refer to LB page 39)

1. A movement that repeats itself
2. Which of the following are examples of cyclic occurrences?
    i. Rainy and Dry season
    ii. formation of day and nights
    iii. festivals
3. Germination, maturation, flowering, pollination, fertilisation (any 4)
4. Rotation, Revolution

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. How did you conclude the lesson?

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

LESSON 6: OBJECTS THAT ARE SEEN IN THE SKY

Reference: Learner's Book pages 40 - 46

Expected Learning Outcomes

- list the objects that appear in the day sky
- list the objects that appear in the sky during the night
- identify the objects that appear in both the day and night skies
- explain why some objects cannot be seen in the sky during certain times of the day

Content Standard: Recognise the relationship between the earth and the sun

Indicator: B4.2.1.2.1 Identify the objects in the sky during day and night

Core Competencies: Personal Development and Leadership Critical Thinking and Problem-Solving.

Subject Specific Practices: Analysing, Evaluating, Generalising.

Introduction

Human eyes can see far into the sky but we cannot see beyond the sky. In the sky are many objects most of which the human eyes can see. The most prominent object that can be seen in the sky during the day is the sun and the clouds. The sun gives us light in the day. However, the sky becomes dark in the night because the sun is not visible at that time. If one look into the sky at night, one will see the stars and in some cases the moon. The stars and the moon gives us light at night.

Clouds are formed as a result of water droplets hanging in the atmosphere. This water droplets are formed from the evaporation of water bodies such as lakes, rivers, seas, oceans, etc. the water droplets rise high above in the sky because they become light in weight upon evaporation. As they rise high above the, they begin to come together which makes them become heavy and eventually fall as rain, dew, etc.

Key Words: Atmosphere, rotation, galaxies

Activity 2.1.2.1 (a) objects in the daytime sky

Materials and resources (low and no cost): A chart of drawing of the sky at night, a picture of the sun, stars and the moon.

Procedure

Put learners in groups. Lead the learners in their groups to go out of the classroom and look up the sky above them (remind learners not to look at the sun directly). Lead the discussion by asking learners to mention some of the objects they see.

Learners will mention objects as the cloud, the sun, birds etc.

Explain to learners that the sky is made up of the cloud, sun but other living organisms such are the birds can also be found in the sky.

Activity 2.1.2.1 (b)

Materials and resources (low and no cost): Charts or pictures showing objects in the sky such stars and the moon.

Procedure

- Show to learners pictures of the stars and the moon. Ask learners describe what they see in the picture. Guide learners to come out with observations such as the presence of stars and moon, learners observe that the sky is dark at night.
- Explain to learners that the sky is dark at night because the sun does not appear at night. Light is provided by the stars and the moon but their light is not as bright as that of the sun.

stars and the moon.

Show to leaners a Venn diagram of things that appear in the day and at night.
There are differences between the day and the night. This is because during the day, part of the earth faces the sun which gives light to the earth. The sun does not move but the earth rotates and as time goes on, that part of the earth moves away from the sun and becomes dark. This appears dark as referred to as night.

Summary

- During the day and night, different objects are seen in the sky
- In the day time, we can see the sun, clouds and birds in the sky
- The stars and moon are the main objects seen in the night sky
- The sun makes the earth warm and gives light to plants to make their food.
- The clouds help in formation of rain.
- The moon and stars help us to see during the night.

Assessment questions.

1. Diagnostic
    i. The parts of the earth which faces the sun experiences brightness called…….. and the part which does not face the sun experiences darkness called…….
    ii. During the day, the light is brighter because…….

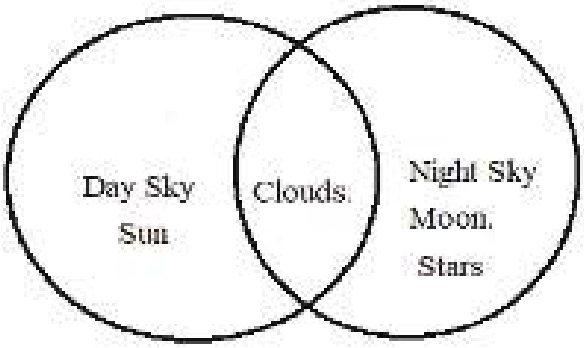
2. Progressive
    i. State two objects you can see in the sky during the day
    ii. State two objects that are permanently present in the sky but cannot be seen at all times.

Answers to assessment questions.

1. Diagnostic.
    i. the parts of the earth which faces the sun experiences brightness called daytime and the part which does not face the sun experiences darkness called night.
    ii. During the day, the light is brighter because the earth faces the sun.
2. Progressive
    i. Sun and cloud
    ii. Stars and sun

Answers to Study Questions (Refer to LB page 46)

1. Sun, clouds, birds
2. Clouds, stars, sometimes the moon and some other planets
3. .



4. Clouds, sun, moon, planet, Birds, stars

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.

LESSON 7: THE PROCESS OF EVAPOTRANSPIRATION

Reference: Learner's Book pages 47 - 51

Expected Learning Outcomes
- Explain the term transpiration
- Explain how trees help to form rain
- Explain evapo-transpiration
- Describe an experiment to demonstrate evaporation

Content Standards: B4.2.1.3 Show understanding of the roles of condensation, evaporation, transpiration and precipitation in the hydrological (water) cycle

Indicators: B4.2.1.3.1: Demonstrate the process of evapotranspiration

Core Competencies: Personal development and leadership, Communication and Collaboration

Subject Specific Practices: Observing, Manipulating, Analysing and Communicating

Introduction
The learner is now familiar with liquids and is able to identify a liquid-liquid mixture and describe how to separate its components. The main liquid the learner encountered in the previous lesson includes ethanol, palm oil and water. Whatever liquid the learner used in the activities of the previous lesson, apart from water, produce some smell. This results from the fact that the liquid evaporates to produce its characteristic smell. This understanding is extended to the behaviour of water which also evaporates from wherever it is found.

Key Words: evaporation, transpiration, condensation

Additional Information
The water in the body of all living things does not remain there forever. It leaves their body and comes back later into their body. Water in the form of vapour in the clouds does not remain there forever. It comes down to the earth and goes back there. There are certain processes involved in this. These processes are condensation, evaporation, transpiration and precipitation which play important role in the hydrological (water) cycle. Living things lose water in the form of vapour into the atmosphere. Water vapour in the atmosphere also condenses to form liquid water. Plants absorb the water into their body through their roots. Some animals drink the water from the different sources of water on the earth.

Starting the lesson

You can start this lesson by asking learners to do some exercise, for example, jumping for about three minutes. Draw the attention of the class themselves to find out if they are sweating. Ask learners what will happen to the sweat for some time. Elaborate on the concept of evaporation based on the answers learner give to your question. Proceed to carry out the activities below.

Activity 2.1.3.1(a) Demonstrate the process of evaporation

Materials/Resources (Low or no cost): transparent glass or a transparent plastic bottle

Procedure

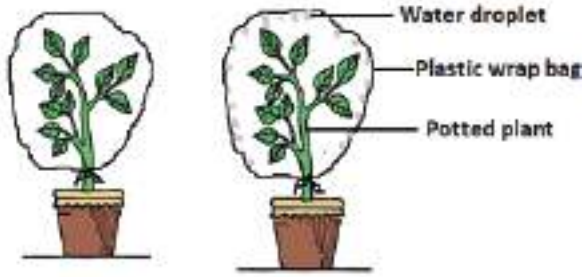
- Give to learners, in groups, a transparent glass or a transparent plastic bottle.
- Tell learners to breathe out or blow air onto the surface of the transparent glass or plastic bottle
- Ask learners what they have seen.
- Tell learners to write down what they have observed in their exercise book.
- Tell learners to share their observations with their classmates.

Activity 2.1.3.1: Demonstrate the process of evapotranspiration

Materials/Resources (Low or no cost): a young potted plant, plastic wrap bag and a rubber band.

Procedure

- Tell learners to organise themselves in groups of four or five.
- Give a young potted plant, plastic wrap bag and a rubber band to learners.
- Tell learners to examine the surface of the leaves of the plants.
- Tell learners to mop off any water droplets on the surface of the leaves.
- Tell learners to tie the plastic wrap bag around the plant up to the stem and leave it for an hour.
- Tell learners to observe both plant and plastic wrap surfaces.
- Ask learners what they have seen.
- Tell learners to write what they have seen in their exercise book.



Start End

Explain the following points to learners: When you breathe in, the air that goes into your body contains very small amount of water vapour. This depends on the amount of moisture in

the air. When you breathe out, the air that comes out also contains water vapour but in greater quantity. When blow air using bicycle pump or any air blower on a transparent glass or plastic bottle, you may not see vapour on them but when you blow air from your mouth or you breathe out air on them you will see water vapour deposited on them. This means that when you breathe out, much quantity of water vapour comes out. Just as humans release water vapour when they breathe out, so do plants when they transpire.

Draw attention of learners to the fact that the water vapour from the plant condenses on the inner wall of the plastic wrap bag. This shows that liquid water evaporates and becomes vapour and also condenses to become liquid.

Summary

- Evaporation and transpiration are important processes in the atmosphere
- Evaporation is the process through which liquid substances change to become gaseous
- It is one of the main processes through which rain water is formed
- Transpiration is the loss of water by leaves
- Transpiration is the main reason why forest areas experience more rain than places without forests.

Diagnostic Assessment

Ask learners in groups of four or five to write down

a. what they will observe when one person from each group breathes on the surface of a louvre blade.
b. The name given to the process that make them observe what they will observe when they breathe on the surface of the louvre blade.

Progressive Assessment

Name the process that makes

a. sweat dry up
b. moisture appear on the screen of your mobile phone when you breathe on to it

Answers to Diagnostic Assessment

a. Water vapour
b. evaporation and condensation

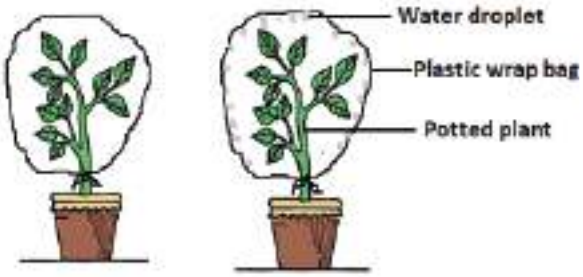
Answers to Progressive Assessment

a. Evaporation
b. Condensation

Answers to Study Questions (Refer to LB page 51)

1.
   - Get a young potted plant, plastic wrap bag and a rubber band from your teacher.
   - Examine the surface of the leaves of the plants.
   - Mop off any water droplets on the surface of the leaves.
   - Tie the plastic wrap bag around the plant up to the stem and leave it for an hour.
   - Observe both plant and plastic wrap surfaces.
   - You will observe that water vapour from the plant condenses on the inner walls of the plastic wrap bag

2. Transpiration and evaporation are important processes in the atmosphere
   Through evaporation substances change state from liquid to gaseous state. transpiration. On the other hand is the loss of water by plants. The water gets into the clouds as vapour and falls back as rain

3. 

   Start End

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.

LESSON 8: TREATMENT OF WATER TO MAKE IT SAFE

Reference: Learner's Book pages 52 - 60

Expected Learning Outcomes

- Identify common practices that make water unsafe to use
- Explain why it is dangerous to drink unsafe water
- Identify some characteristics of safe drinking water
- Describe some processes used in treatment of water

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

Indicator: B4.2.1.5.1 Demonstrate ways of making water safe for use

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

Subject Specific Practices: Observing, Manipulating, Analysing, Communicating

Introduction

Water and air are important natural resources. Water is one of the important needs of living things. All living things need water. We get water from different sources. What are the different sources of water in your communities?

Key Words: sedimentation, chlorine, alum, odourless

Additional Information

Water and air are important natural resources. Water is one of the important needs of living things. All living things need water. We get water from different sources. What are the different sources of water in your communities? Do you experience rainfall in your community? Do you have pond, sea, pipe-borne, well, river, lake or lagoon in your community? Look at the diagrams in figure 2.1.5.1

From the pictures in figure 2.1.5.1.you can see that the sources of water are: Rain, pond, sea, pipe-borne, well, river, lake and lagoon.

Water from the various sources may not be clean. Some of the water samples are from the different sources you have seen in the diagram in figure 2.1.5.1. In order to examine the water samples there are certain questions you need to have in your mind. These questions include: What is the colour of the water from the different sources? How does the water from the different sources smell like? Do the water samples have particles in them? Can you say that all the water samples clean? Can you drink them? When you are able to answer these questions correctly you can say what the qualities of good drinking water should be.

What are the qualities of good drinking water?

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

Activity 2.1.5.1(a) Examining water from different sources

Materials/Resources (Low or no cost): the following types of water in small bottles: rain water, pipe water/tap water, well water, river water, sachet water.

Procedure

- Tell learners to organize themselves in groups of four or five.
- Give to learners the following types of water in small bottles: rain water, pipe water/tap water, well water, river water, sachet water.
- Ask learners which of the water samples has qualities of good drinking water and asks them to give reasons for their answer.

- Tell learners to look at the water carefully and asks them whether it contains solid particles, smells or has any colour.
- Caution learners never to taste water from any source.

How to make water safe for use

You can make water safe for use. You can do this by the following ways:

- filtering
- boiling
- addition of iodine tablets
- use of chlorine
- use of water filters
- addition of alum and many more.

 filtering	 boiling	 addition of iodine tablets
 use of chlorine	 addition of alum	 use of water filters

Activity 2.1.5.1(b): Making water safe for use by filtration

Materials/Resources (Low or no cost): white calico or cotton wool, container

Procedure

- Tell learners to bring white calico or cotton wool to school the day before this lesson.
- Tell learners to organise themselves into groups of four or five during this lesson after inspecting what the learners have brought to school.
- In groups of four or five white calico or cotton wool to school.
- Tell learners to fetch some water into a container.
- Tell learners to add some soil particles to make the water dirty
- Tell learners to spread white calico to cover the opening of another container.

- Tell learners to shake the water well to mix with the soil particles.
- Tell learners to pour the dirty water through the white calico and wait for some time and observe what is left on the white calico.
- Tell learners to discuss
  i. their observation with their classmates.
  ii. whether it is safe to drink this water.

Note

Explain to learners the fact that

- water which passes through the white calico is cleaner than the water they have poured onto the white calico.
- the unwanted particles in the water were left on the white calico.
- this way of making water clean for use is called filtration.
- the filtered water is clean but may not be suitable for drinking

Activity2.1.5.1(c): Making water safe for use by using alum
Materials/Resources (Low or no cost): alum, water, container

Procedure

- Give to group of learners, alum.
- Tell learners to fetch some water into a container.
- Tell learners to put alum into the water and wait for 10minutes and observe the water in the container.
- Tell learners to discuss their observation with their group members.
- Tell learners to filter the water using the white calico.
- Tell learners to discuss
  i. their observation with their group members after filtering the water with the white calico.
  ii. (ii) whether it is safe to drink this water.

As in the previous activity, explain to learners that

- when the alum was put into the water, the particles settle under the water in the container.
- after filtering, they will see these particles on the white calico.
- these particles on the calico were dissolved in the water but the alum was able to make them settle.
- it is the alum that makes particles in water settle to make the water clean.
- though this water appears clean, it may not be safe for drinking because it may still contain germs.

Activity 2.1.5.1(d): Making water safe for use by boiling
Materials/Resources (Low or no cost): dirty water, two beakers or any two suitable containers, heat source

Procedure

- Give dirty water to the groups of learners
- Tell learners to put the dirty water in a container and heat it on fire to boil.
- Tell learners to leave the water for some time to settle.
- Tell learners to pour the water gently into another container (decant) and then observe the particles left in the container.
- Tell learners to discuss
  i. their observation with their group members.
  ii. whether it is safe to drink this water.

Explain to learners that

- even though the water collected from you looked clean, it contains some particles.
- boiling the water makes the particles settle under the water and also kills germs in the water.

Summary

- We must always make sure that we drink safe and treated water.
- Drinking untreated water is dangerous to our health
- There are different ways through which water can be treated.
- The ways of treating water include boiling, filtration, sedimentation and adding of chlorine.
- On our own, we can undertake some treatment methods such as boiling and filtration.

Diagnostic Assessment

Ask learners in groups of four or five to

a. give reason why water which does not contain particles can be considered unclean
b. state why using a piece of cloth to filter water does not make it clean

Progressive Assessment

State what the following can do to an unclean water:

i. filtering
ii. boiling
iii. use of chlorine

Answers to Diagnostic Assessment

a. (a) It may contain germs. It may also have taste and smell
a. (b) It only removes particles but may not remove some germs, taste and smell

Answers to Progressive Assessment

i. It removes solid particles
ii. It kills germs
iii. It kills germs

Answers to Study Questions (Refer to LB page 60)

1. (i) Sedimentation
   (ii) Boiling
   (iii) Filtration
   (iv) Addition of chlorine

2. (a) Tasteless, colourles, odourless and without particles
3. (a) Particles, colour, small living organisms.
   (b) By boiling, adding alum and filtration.
4.

S/N	Method of Treatment		Purpose
1	Adding of alum		To kill microorganisms
2	Adding of chlorine		To aid suspended particles to settle
3	Sedimentation		To trap all suspended particles
4	Filtration		To help suspended particles settle faster

Diagnostic assessment for facilitator

1. How did you introduce the lesson to learners?
2. What did you do to kindle learners' interest in the lesson?
3. Did the learners appreciate the relevance of this lesson to daily life?
4. How did you make sure every learner demonstrate creativity during the lesson?
5. Were the learners yearning for the lesson to continue even though you have ended it?
6. How did you conclude the lesson?

LESSON 9: FUNCTION OF THE PARTS OF PLANTS

Reference: Learner's Book pages 61 - 64

Expected Learning Outcomes
- Identify the main parts of plants
- Describe the function of each part

Content Standard: B4.2.2.1 Demonstrate understanding of the life cycle of plants

Indicators: B4.2.2.1.1. Observe, identify and give functions of parts of plants

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

Subject Specific Practices
- Observing,
- Classifying
- Analysing
- Evaluating
- Generalising

Introduction
Take a look at the plants near your school and home. Can you identify the different parts of plants? Just as human beings have different body parts, plants also have different parts that perform different functions for the plant to grow and develop well. There are some parts that all plants have in common. We will learn about those parts and their functions to plants.

Key Words: branches

Additional Information
Just like human beings such as you have different body parts, plants also have different parts which perform different functions for the plant to grow and develop well.
A plant has roots, leaves, stem and flowers.

Functions of the parts of a plant

Root:
- It holds the plant firmly in the soil.
- It absorbs the water and mineral salts for the plant.

Stem:
- It holds the leaves
- It transports water and mineral salt to the leaves

Leaves:
- They manufacture food for the plant.

Flower:
- It produces fruits and seeds.

Starting the lesson
Start this lesson by taking learner round the school compound

Activity 2.2.1.1 Nature's walk to look for young plants
Materials or Resources (low or no cost): Uprooted young plants

Procedure
- Put learners into groups of five each. Lead learners into the school surrounding to look for young plants.
- Each group uproots a young plant of its choice.
- Back in the classroom learners observe the uprooted young plant and identify the parts. Lead learners to name the identified parts. The parts include roots, stems, leaves and flowers.
- Lead learners to give functions to the parts. The roots absorb water and minerals and also hold the plant firmly in the soil.
- The absorbed water and minerals are used to make food.
- The stem transports the water and minerals up the leaves. The leaves are exposed to sunlight and can easily absorb it. The leaves also have openings which allow carbon dioxide from the atmosphere to enter the leaf for photosynthesis to occur to produce food.
- When the plant matures it flowers and produces seeds which germinate to produce young plants.
- Guide learners to draw animated diagrams of the plants. The diagram showing the parts of the plant labelled. The function of the parts should be shown by their names.

Project: *Ask learners to create a plant album of different types of plants (shrubs, trees, climbing and creeping plants)*

Summary

- There are some parts that are common to all plants
- These are the root, stem, leaves and flowers
  The main function of the roots is to hold the plant firmly in the ground and also absorb water and nutrients from the soil.
- The leaves help the plant to prepare its own food.
- The stem of the plant supports the leaves and flowers.
- The flowers help the plant to produce fruits and seeds.

Assessment questions

1. Diagnostic
   i. Which part of the plant holds the plant in the soil?
   ii. Where is plant food made?

2. Progressive
   i. Can young plants reproduce?
   ii. Where are leaves of plants found and why?

Answers to assessment questions

1. Diagnostic
   i. The roots
   ii. In the green parts of the plant(leaves)

2. Progressive
   i. No, they have to grow and produce flowers
   ii. In the air above the soil so that they can absorb carbon dioxide and sunlight.

Answers to Study Questions (Refer to LB page 64)

1. Root, stem, leaf and flower
2. Answer the following questions about the various parts of plants.
    i. Root
    ii. Leaf
    iii. Flower
3. Accept any appropriate drawing

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?

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

LESSON 10: GERMINATION OF SEEDS

Reference: Learner's Book pages 65 - 71

Expected Learning Outcomes
- List the factors necessary for germination to take place
- Identify the main stages in the germination of seeds
- Describe the differences between the germination of maize and bean seeds

Content Standards: B4.2.2.1 Demonstrate understanding of the life cycle of plants

Indicators: B4.2.2.1.2: Examine some common seeds and how they germinate

Core Competencies
- Personal development and leadership
- Communication and Collaboration
- Critical Thinking and Problem-Solving
- Creativity and Innovation

Subject Specific Practices: Manipulating, Observing, Analysing, Evaluating, Recording

Introduction
In the previous lesson we learnt about the parts of plants. When you open up a mango, orange or pawpaw fruit you see seeds in them. Seeds are the parts of plants that are used to make new baby plants called seedlings. Before a seed becomes a seedling, some factors must be available. In this lesson we will focus on how seeds grow to become baby plants through a process called germination.

Key Words: testa, absorption, rapturing , sprouting, elongation

Additional Information

Germination
Germination is the coming out of the embryo (new developing plant) from a seed when some conditions are met. A seed will germinate only if it is viable (living). A viable seed is always in a dormant state if conditions are not favourable for germination. There are other conditions that must be met for germination to occur.

Conditions Necessary for a seed to Germinate

The conditions necessary for seed germination are:

- Presence of air
- Presence of moisture or water
- Suitable temperature (not too low or too high to kill the seed)

Note: If any of these conditions is not met, the seed would not germinate.

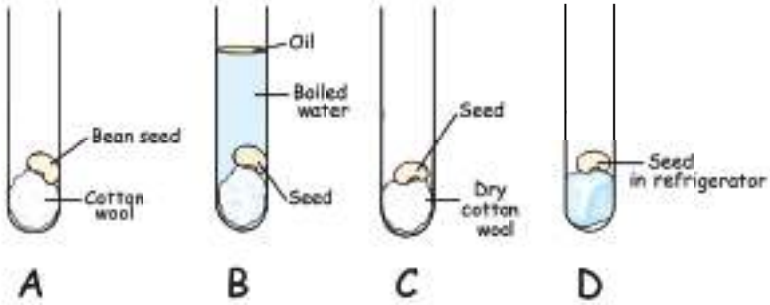
Demonstration of the conditions necessary for seed germination

Activity 2.2.1.2:To show the conditions necessary for germination of seeds

Materials/Resources (Low or no cost):

Procedure

- Obtain four viable seeds, for example bean seeds or maize seeds.
- Soak cotton wool in water and place a viable seed on it and put in a test tube labelled A. Make sure there is air available in the test tube.



The diagrams show viable seeds placed in four tests tubes under different conditions.

- Boil water for five minutes and let it cool.
- Pour the cool water in test tube B. Place a viable seed on a cotton wool. Soak with water and place it in the test tube B. pour oil on the surface of water in test tube B.
- Place a viable seed on a dry cotton wool and put in test tube C and make sure air is available.
- Place a viable seed on a cotton wool soaked in water and place it in test tube D. Put test tube D in a refrigerator.

Leave the experimental set up for 7 days. Observe what happens and discuss with your group members what you discovered.

Note: In test tube A, the bean seeds will germinate because all the conditions necessary for germination were present.

These are:
- Air
- Moisture or water
- Adequate (not high or low) temperature.

In test tube B, boiling the water drove out all air from the water. The oil will prevent any air from entering the water. The bean seed will not germinate because there was no air available for germination.

In test tube C, the cotton wool is not soaked in water. The bean seed will not germinate because there was no water available for its germination.

Test tube D is placed in a refrigerator. The temperature in the refrigerator is too low (not adequate) for the seed to germinate.

The experiment in test tubes A, B, C and D show that the following conditions are necessary for a viable seed to germinate.
- Air
- Water or moisture
- Adequate (not too high or too low) temperature.

Project: *Exploring conditions for seed germination*

In your groups (five in a group) read and discuss the conditions necessary for a seed to germinate.

Now use your knowledge and explore the conditions necessary for germination to take place.
Draw diagrams of your findings.
Write a report on your findings and present in class.

Summary
- Germination is the coming out of the embryo (new developing plant) from a seed when some conditions are met.
- The conditions necessary for seed germination are air, moisture or water and suitable temperature (not too low or too high to kill the seed).
- The main stages in the germination of a seed are absorption of water by the seed coat, rapturing of the swollen seed coat, sprouting of the root, sprouting of the stem and seed leaves, the elongation of the root and stem.

Assessment questions

1. Diagnostic
    i. What is the part of the plant that germinates?
    ii. Name the material needed by plants to germinate.

2. Progressive
    i. What happens to a seed placed in a beaker of water for 24hours?
    ii. Do seeds need soil to germinate?

Answer to assessment questions

1. Diagnostic
    i. Seed
    ii. Water

2. Progresive
    i. It becomes swollen by absorbing water
    ii. No they do not

Answers to Study Questions (Refer to LB page 71)

1. Viability of the seed, suitable temperature, air and water(moisture)
2. Germination is the coming out of the embryo (new developing plant) from a seed when some conditions are met.
3. Cooked seeds are no longer viable, so they cannot germinate.
4.
    - absorption of water by the seed coat
    - rapturing of the swollen seed coat,
    - sprouting of the root
    - sprouting of the stem and seed leaves
    - the elongation of the root and stem

Diagnostic assessment for facilitator

1. Did every learner show interest in the lesson?
2. Did the learners ask you questions about the lesson?
3. What pedagogy did you use to deliver your lesson?
4. Were the learners able to link the lesson to crop production in the country?
5. Did you discuss home learning assignment with the learners?

STRAND 3: SYSTEMS

SUB-STRAND 1: THE HUMAN BODY SYSTEMS

LESSON 11: THE DIGESTIVE SYSTEM OF HUMANS

Reference: Learner's Book pages 73 - 80

Expected Learning Outcomes

- list the main organs that form the digestive system of humans
- explain the function of each part of the digestive
- describe the process through which food is digested as it moves down the alimentary canal

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

Indicators: B4.3.1.1.1 Know the organs of the digestive system and their functions.

Core Competencies

- Digital Literacy Creativity and innovation
- Personal development and leadership
- Communication and Collaboration.
- Critical Thinking and Problem-Solving

Subject Specific Practices: Observing, Manipulating, Analysing, Generating, Communicating,

Introduction

A living capable of a separate existence is called an organism. All organisms are made up of cells – the basic unit of life, which carry out all the vital chemicals processes. The simplest organisms have just one cell. They are unicellular, but very complex ones e.g. humans, have many billions. They are multicellular and their cells are of many different types, each type specially adapted for its owns particular job. Group cells of the same type together with non-living material make up the different tissues of the organism, e.g. Muscle tissue. Several different types of tissue together form an organ, e.g. stomach, and a number of organs together form a system e.g. Digestive system.

Key Words: Alimentary canal, oesophagus, enzymes, intestines

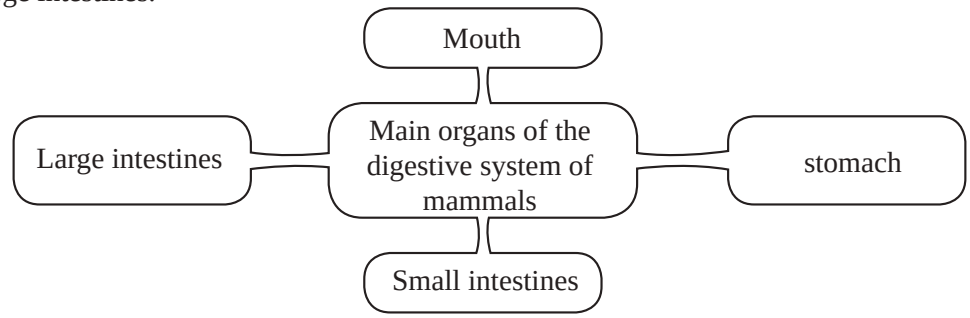
Additional Information

Main Organs of the Digestive System

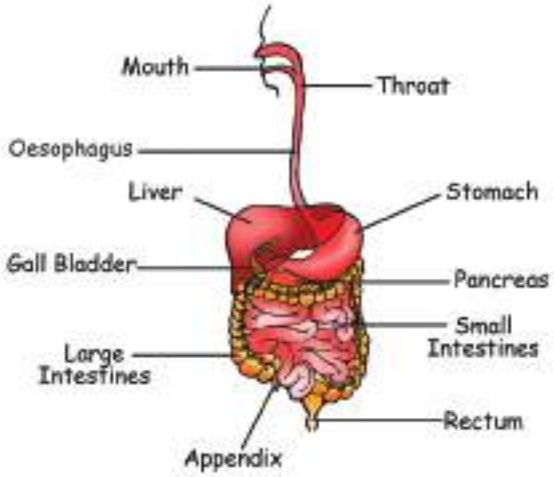
Give a chart of the digestive system to learners.

Use the chart to identify the main organs of the digestive system.

The digestive system consists of certain organs. These include mouth, stomach, small intestines and large intestines.



In their groups, let learners observe and discuss the chart above.



In groups let the learners discuss the drawing above. They will realise that the digestive system of humans is made up of different parts. The parts include:

- Mouth
- Stomach
- Small intestine
- Large intestine

Each part of the digestive system performs particular functions.

Functions of the Mouth

Food is taken into the mouth and chewed with the teeth to break it down into smaller particles. This enables saliva which contains enzymes (which help in chemical breakdown of food) to mix with the food. The saliva also makes the food soft and easy to swallow. The swallowed food moves through the gullet into the stomach.

Functions of the stomach

The broken down from the mouth passes through the gullet into the stomach. The stomach is a large sac in which digestion takes place. It also contains other substances such as hydrochloric acid, enzymes and mucus.

The hydrochloric acid kills bacteria in the food. It also neutralizes the alkali in the food from the mouth.

The enzymes help to break down food into smaller particles.

The mucus protects the inner lining of the stomach wall.
Some substances such as water and alcohol pass through the wall of the stomach into the nearby blood vessels.

The semi-digested food (chime) goes into the small intestine.

Functions of the Small Intestine

The small intestines are main site of digestion. Secretions such as bile and enzymes enter the small intestines and help to break down different types of food into their end products. The end products of different types of food are absorbed into the blood from the small intestine. The remaining semi-liquid waste mixture in the small intestines, pass into the large intestines.

Functions of the Large Intestine

The large intestines are a thick tube which receives waste from the small intestines. Most of the water in the waste is absorbed into the nearby blood vessels. This leaves semi-solid mass (faeces) which is pushed out of the body (defecation)

End products of digestion

Type of food	End product
Carbohydrates	Glucose
Protein	Amino acid
Fats and oils	Glycerol and fatty acids

Now you know the organs of the digestive system and their functions.

Starting the lesson

- Show Videos, pictures and models of the digestive system
- Learners keenly observe the organs of the digestive system.

Explain to learner the functions of the various organs in the digestive system.

- Draw a diagram of the digestive system and cut out the various parts of the system into flash cards.

- Learners build the digestive system by arranging the parts in an orderly manner as the appear in the digestive system.
- Engage leaners in an activity to role – play the various parts of the digestive system and their functions with the aid of flash cards

In groups (four or five) in a group, let learners draw a diagram of the digestive system.
Cut out the various parts of the system into flash cards.
Let learners randomly pick the parts of the digestive system on flashcards.
Let learners build the digestive system by arranging the parts in an orderly manner as they appear in the digestive system.
In groups, engage learners in activity to role-play the various parts of the digestive system and their functions, with aid of flashcards.

Summary

- The digestive system consists of organs which help to breakdown the food we eat into simpler substances that can be absorbed by the body easily.
- The parts of the digestive system include the mouth, gullet, stomach, small intestines and large intestines.
- Food is taken into the mouth and chewed with the teeth to break it down into smaller particles.
- The broken down food from the mouth passes through the gullet into the stomach
- The small intestines are main site of digestion. The large intestines are a thick tube that receives waste from the small intestines.
- The undigested part of the food comes out of the body as faeces.

Diagnostic assessment questions

1. Name two substances that can be found in the stomach
2. In which part of the digestive system can faeces be found

Progressive assessment questions.

1. Several different types of tissue together form an organ. True/False
2. Stomach is an example of organ. True/ False
3. Explain what system is. Write one example of a system
4. Arrange the following parts of the digestive system in the right order: Large intestine, stomach, mouth and small intestine

Answer to a diagnostic assessment question

1. Enzymes, mucus, hydrochloric acid
2. Large intestine

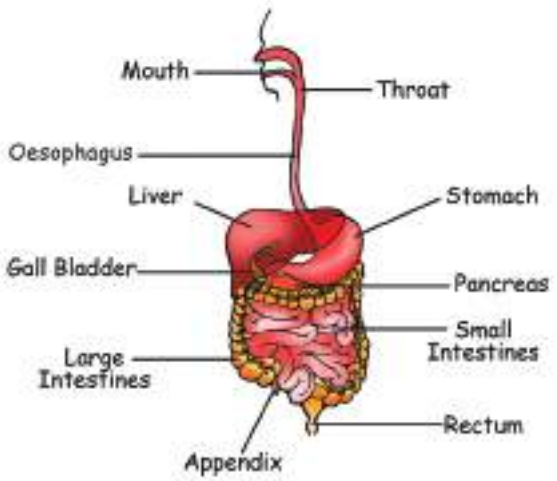
Answers to progressive Assessment questions

1. True.
2. True (Stomach is an example of an organ)

3. Several different types of tissue together form an organ. e.g. a stomach and a number of organs together form a digestive system. An example of system is the digestive system.

Answers to Study Questions (Refer to LB page 80)

1. Oesophagus(Gullet), stomach, small intestine, large intestine
2.
   i. False
   ii. True
   iii. True
   iv. False
   v. True
3. Kenkey contains starch. The kenkey will be chewed or swallowed. When it is chewed it breaks into smaller pieces. It is mixed with saliva which contains enzymes which begins to digest it. The starch in the kenkey is finally digested into glucose in the small intestine.
4. Answer the following questions about the digestive system
   i. Alimentary canal
   ii. Mouth
   iii. Oesophagus(gullet)
   iv. Enzymes
   v. Small intestine
5.



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 appreciate the importance of knowing the functions of the parts of the digestive system?

LESSON 12: THE SUN AS THE CENTRE OF THE SOLAR SYSTEM

Reference: Learner's Book pages 81

Expected Learning Outcomes

- Identify the components of the solar system
- Know that the sun is the centre of the solar system
- Mention the names of planets in the solar system
- Know the difference between a planet and a satellite

Content Standards: B4. 3.2.1.1. Show an understanding of the orderliness of the sun, planet and satellite in the solar system, as well as the important role of the sun in the existence of the solar system.

Indicators: B4. 4.2.1.1 Explain that the sun is at the centre of the solar system

Core Competencies: Communicate and Collaboration, Personal Development and Leardership, Critical Thinking and Problem-solving, Creativity and Innovation.

Subject Specific Practices: Designing Experiment, Planning, Observing, Reading, Analysing.

Introduction

In the sub-strand cycles, we learnt about the objects that appear in the day and night skies. We learnt that the sun was the main body that caused the formation of day and night. We also learn that some of the objects that appear in the night sky are actually planets. We will learn more about the relationship between the sun, our earth and other planets.

Key Words: satellite, solar, planet, earth, stars, sun, moon

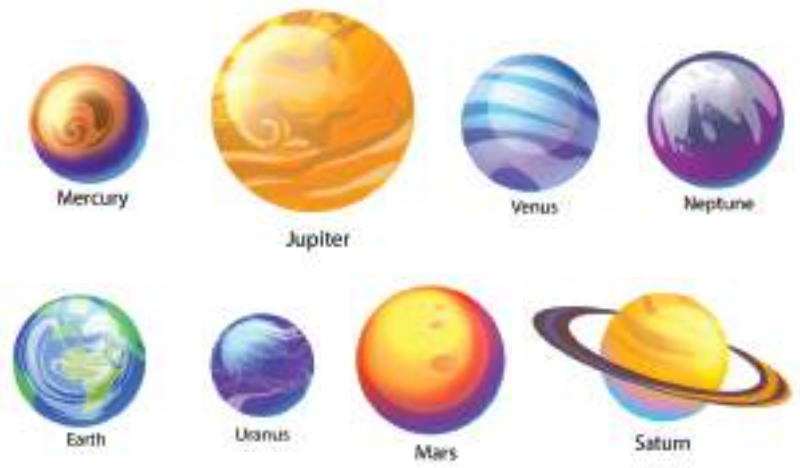
Additional Information

Solar System

The earth on which we walk is a planet which is like a huge ball hanging in the sky, spinning on its axis and moving round the sun. There are other such bodies in the sky like the earth. Some of them are also planets. All these come together to form the solar system. The solar system is made up of the sun, planets and some other heavenly bodies.

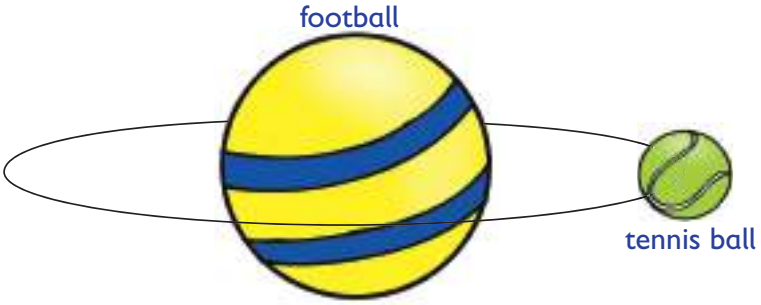
The sun is the largest body in the entire solar system.

The diagram shows an illustration of the solar system. The sun is at the centre and does not move. The planets are held in their orbits by the attraction of the sun. They move in their orbits round the sun. The planets also rotate about their axis. Do you know the names of the planets in the solar system? In order of closeness to the sun, the planets in the solar system are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune. Pluto which was previously regarded as a planet is now seen as a dwarf planet. This means there are a total of 8 planets in the solar system including our earth. The largest Planet in our solar system is Jupiter. It is bigger than the earth by about 20 times. The smallest planet is mercury. Each planet takes a period of time to move round the sun. The Earth takes 365¼ days to move round the sun once. This makes one year. Different planets take different number of days to move round the sun.



All the planets get their heat and light from the sun. The moon is a satellite. A satellite is a heavenly body that moves around a bigger body. The earth has one satellite (one moon). Some

other planets have more than one satellite (many moons). For instance the planet Jupiter which is the largest planet has 79 moons.



Starting the lesson

- Start the lesson by present learners with a chart, model or video showing the solar system. Draw the solar system, using different colours to illustrate the different bodies.
- Guide learners to role-play the stars, planets and satellites in the solar system in the following activity:

Activity 3.2.1.1 : Role Playing the parts of the Solar system

Materials and resources (low and no cost): Chart on the solar system, the sun and the other planets.

Procedure

- Tell learners to form large groups of about 10 people for this activity.
- In each group, let one member stands at the centre. This person represents the sun. Other members stand at different distances from the member at the centre. They represent the planets.
- Other members stand close to one or two of the members in their different orbits. They stand for satellites.
- Let each member move round the center person that represents the sun. Let the member who represents the satellite also move round the person representing the planet.

Now present the chart of the solar system and help learners to identify the sun as being at the centre of the solar system.

Let learners discuss the benefit of the sun to the solar system among themselves in their groups and let them write them down.

Go round each group and check what they have written down. Pick the correct benefits they have written down and fine-tune them to include the following:

- the sun produces all the energy that is used by all planets.
- the earth has living things because it is warm due to the heat from the sun.
- the sun also provides the earth with sunlight which is used to prepare plant food.
- all animals live on the food prepared by plants.

- without the sun, there will be no life on Earth.
- the sun also sustains the other planets within the solar system.
- without the sun, the planets in the solar system and their moons will fail to exist.

Project: *Making a Design of the Solar System*

- *In groups of two, ask learners to mould the solar system using clay*
- *Let them make circular or round designs to represent each of the planets and the sun.*
- *Let them also place the sun in the middle and arrange the other planets around it based on their position within the solar system*
- *Finally let them label each planet*

Summary

- The sun is at the centre of the solar system. It does not move.
- There are 8 planets in the solar system,
- The planets move round the sun in their orbits.
- The planets are held in their orbits by the gravitational attraction of the sun.
- The sun provides all energy to the planets.
- Some of the planets have satellites that move round these planets.
- They are called moons.

Assessment questions.

1. Diagnostic
   i. What is found at the centre of the solar system?
   ii. State two benefits of the sun in the solar system.

2. Progressive
   i. Which bodies move round the planets?
   ii. Name one planet other than the earth.
   iii. How are the bodies that move round the planets called?

Answers to assessment questions.

1. Diagnostic
   i. The sun
   ii. a. gives light to humans and other living things to see
   b. helps plants to produce their food through photosynthesis
   c. provides heat to leaving organisms
   d. help to dry substances

2. Progressive.
   i. Satellites
   ii. mars, Venus, mercury, Jupiter Saturn, Neptune, etc.

Answers to Study Questions (Refer to LB page 86)

1.
    i. A=Mercury, B=Venus, C=Earth, D=Mars, and E=Jupiter
    ii. Sun
    iii. How many days does it take our earth to move around the structure in the middle
    iv. Mention one benefit of the structure in the middle to the earth.
2. Mercury, Venus, Earth, mars, Jupiter, Saturn, Uranus, Neptune
3. The sun is at the centre of the solar system. The planets are heavenly bodies that move around the sun in orbits. There are a total of eight planets in our solar system. The largest planet is called Jupiter

Diagnostic assessment for facilitator

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

STRAND 3: SYSTEMS

SUB-STRAND 3: ECOSYSTEM

LESSON 13: ECOSYSTEMS

Reference: Learner's Book pages 87 - 90

Expected Learning Outcomes

- Know what an ecosystem is
- Identify the components within an ecosystem
- Mention examples of ecosystems
- Explain how the organisms within an ecosystem depend on each other

Content Standards: B4.3.3.1 Show understanding and appreciation of the interactions and interdependencies of organisms in an ecosystem

Indicators: B4.3.3.1.1 Explain the concept of ecosystem

Core Competencies: Cultural identity and Global Citizenship, Personal development and leadership, Critical Thinking and Problem Solving, Creativity and Innovation

Subject Specific Practices: Observing, Manipulating, Predicting, Analysing, Generalising, Communicating

Introduction

There are always interactions between all living things so long as they live together in the same place. As they live in the same place and interact, they derive benefits from each other and the environment in which they all live. Humans eat goat and goat eats grass and grass makes its own food but needs sunlight, carbon dioxide and water. The carbon dioxide and water are obtained from the environment.

Key Words: marine, indiscriminate, rainforest, deforestation

Additional Information

All living things live in a place which can be called their home. They live comfortably at those places. They carry out all activities that living things carry out there. This is their natural home. The natural home of a group of living things or a single living thing is called Habitat. Small habitats can be within large habitats, e.g. a waterhole in the savanna biome.

The community of plants and animals in a given habitat, together with the non-living parts of the environment is called Ecosystem. A food chain is a linked series of living things, each of which is the food for the next in line.

Community: the group of plants and animals found in one habitat is called community. They all interact with each other and their environment.

Ecosystem

The community of plants and animals in a given habitat, together with the non-living parts of the environment e.g. air or water is called Ecosystem. An ecosystem is a self-contained unit, i.e. the plants and animals interact to produce all the materials they need.

There is a complex network of food chains in an Ecosystem. A food chain is a linked series of living things, each of which is the food for the next in line.

Plants make their food from non-living matter by a process called photosynthesis, and are always the first members of a chain.

Animals cannot make their own food and rely on the food making activities of plants.

Starting the lesson

Materials and Resources (Low or No Cost): Video , pictures

Procedure :

- Begin lesson by asking learners the functions of the individuals in their homes.
- What are some of the functions of fathers, mothers, elder sisters and elder brothers?
- Learners respond to show their duties. Father provides money for the running of the home. Mother supervises the cooking of food. The elder girls help mother and the elder boys carry water and do other jobs at home. With this set up, everybody is happy and life goes on happily. Everybody in the family is important and depends on every other member of the family.
- Mention different habitats. Ask learners to mention the types of organism found in each, for example, in a pond habitat. Learners mention fish, weeds, toads, frogs and their larvae.

- On land, we can find trees, shrubs other small plants, grasshoppers, birds and other organisms.
- Show videos of different habitats. Habitat of a forest with plants, animals, tall trees, habitat of a river or stream with fish and plants.
- Explain that the ecosystem is made up of different habitats.
- Lead learners to discuss the importance of each member of a particular habitat.
- The green plants make food, animals eat plants and the carnivores eat the herbivores. The habitat is balanced. Ask learners the effect for example of the absence of herbivores in the ecosystem. The plants will overgrow, the carnivores will not get food and the balance will be offset.
- Similarly when we destroy our forests, by looking for gold and other minerals, there is carbon dioxide build up and this poisons the environment.
- Explain that learners should try to preserve their habitats by not destroying forests, not burning the bush and domestic waste. These practices will cause imbalance of the ecosystem.

Summary

- The community of plants and animals in a given habitat, together with the non-living parts of the environment is called Ecosystem.
- Examples of ecosystems include a rainforest, a large tree, a pond or a desert.
- Every member of the ecosystem is important.
- We must avoid engaging in activities such as illegal mining, deforestation and indiscriminate burning since these activities destroy ecosystems.

Assessment questions

1. Diagnostic
   i. What is a habitat?
   ii. Name two important organisms in a water habitat

2. Progressive
   i. State the effect of cutting down of trees in a forest
   ii. Can the family set up be likened to the ecosystem? Explain briefly.

Answers to assessment questions

1. Diagnostic
   i. A habitat is a place where an organism can live successfully.
   ii. Fish, tadpole water plants.

2. Progressive
   i. Carbon dioxide is absorbed by plants. When plants are cut down the concentration of carbon dioxide increases and leads to climate change since carbon dioxide is a greenhouse gas.

ii. Yes, every member of the family has a role he or she plays to hold the family together. Similarly all components of the ecosystem work together to sustain the system.

Answers to Study Questions (Refer to LB page 90)

1. Living things: frogs, fish and trees
   Non-living things: soil, rocks and water (any 2)
2. illegal mining, deforestation and indiscriminate burning of bush
3. An ecosystem in the forest contains mango trees, monkeys, bananas, river and mountain.
   i. Plant make food for animals to feed on
   ii. Sunlight. Plants use sunlight to prepare food for themselves and for animals to feed on.
   iii. To stop destroying trees.

Diagnostic assessment for facilitator

1. Did you engage the learners in any activity to make them acquire manipulative skills
2. Did every learner benefit from the lesson

STRAND 4: FORCES AND ENERGY

SUB-STRAND 1: SOURCES AND FORMS OF ENERGY

LESSON 14: HOW HEAT CHANGES THE STATE OF SUBSTANCES

Reference: Learner's Book pages 92 - 97

Expected Learning Outcomes

- Explain how substances change from one state to another
- Relate the change of state of substances to the loss or gain of heat
- Describe experiments to demonstrate the effect of heat on the states of substances

Content Standard: Demonstrate understanding of the concept of energy, its various forms, and sources and how to transform and conserve it.

Indicators: B4.4.1.1.1 Identify the effect of heat on the change of state of substances

Core Competencies: Personal development and leadership Communication and Collaboration. Critical Thinking and Problem Solving

Subject Specific Practices: Observing Manipulating Analysing Recording Measuring Communicating

Introduction

Heat is a form of energy which determines the degree of hotness or coldness in a body. Many activities in our everyday life involve the use of heat energy. For instance, when we are cooking, heat is required to prepare the food. When we are drying foods such as maize, rice, or even fish, heat energy is required. Our body requires heat to function well especially on cold weather. Without heat energy, most activities such as drying of cloths cannot take place.

Heat also causes substances to change from one state to another. Three states of matter exist at room temperature. These are solid, liquids and gases.

When heat is applied to substance in the solid state, it changes to the liquid state and when further heat is applied to the substance in the liquid state, it changes further to a gaseous state.

Key Words:

Starting the lesson

Start this lesson by engaging the learners with the activities below

Activity 4.1.1.1. (a) Class activity

Materials and resources (low and no cost): Ice cubes, metallic bowl or anything that can be heated, glass beaker.

Procedure

- Begin lesson by showing three substances in the three states. Holding candle in your hand asks learners the following questions; what is the state of this? Can it become liquid? How can it become liquid? If heat is applied to it what will be observed happening to the candle? And does same holding ice cubes. Demonstrate to learners the processes that lead to melting.
- Put some ice cubes into a metallic container or glass beaker and put it on source of heat for about 10 mins.
- Lead learners to discuss what they observe with their classmates.

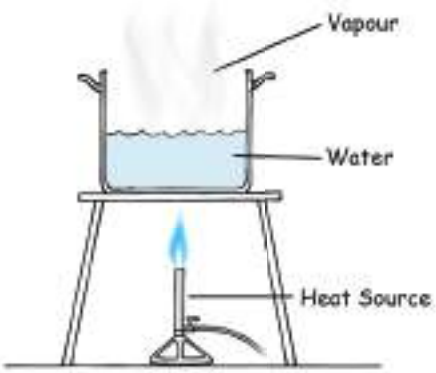
Explain to learners that as heat is applied, the ice cubes change into liquid (water). This process is called melting. When solids melt they form liquid. For a substance to melt it must gain heat energy.

Activity 4.1.1.1 (b) class activity

Materials and resources (low and no cost): Water, aluminium pan, source of heat.

Procedure

- Show three substances in the three states to learners. Holding candle then asks learners the following questions; what is the state of this? Can it become liquid? How can it become liquid? If heat is applied to it what will be observed happening to the candle? And does same holding ice cubes.
- Demonstrate to learners the processes that lead to boiling.
- Put some water into a metallic container or glass beaker and put it on source of heat for about 10 minutes.
- Lead learners to discuss what they observe with their classmates.
- Explain to learners that, as heat is applied, the water change into gas (bubbles). This process is called boiling. When solids melt they form liquid. For a substance to melt it must gain heat energy.



Cover the aluminium container for another 10 min and opens the container. Ask learners what they have observed. Learners are encouraged to discuss their observation with their classmates. Explain to learners that as the aluminium container was heated with the water, the water became hot and started to evaporate. When the container was covered, the water boiled and when steam (vapour) got to the cooler surface, it changed back to water. The water on receiving heat energy changed to steam (vapour). This is known as evaporation. When the steam got to cooler surface, it changed to water. This is known as condensation.

Class activity 4.1.1.1 The effect of heat on solid shea butter.
Materials and resources (low and no cost): Candle or Bunsen burner under the tripod stand, source of heat.
Procedure

- Begin lesson by showing shea butter , asks learners the following questions; what is the state of this? Can it become liquid? How can it become liquid? If heat is applied to it what will be observed happening to the shea butter?
- Demonstrate to learners the process involved in the melting of the shea butter.
- Put shea butter in glass beaker and put it on source of heat for about 10 mins.
- Lead learners to discuss what they observe with their classmates.

Activity 4.1.1.1 Lead this activity: The effect of heat on candle.
Materials and resources (low and no cost): Source of heat, candle, petri dish.
Procedure

- Begin lesson by showing candle. Asks learners the following questions; what is the state of this? Can it become liquid? How can it become liquid? If heat is applied to it what will be observed happening to the candle?
- Demonstrate to learners the process involved in the melting of the candle.
- Put candle in glass beaker and put it on source of heat for about 10 mins.
- Lead learners to discuss what they observe with their classmates.
- Illustration: Draw diagram of melting candle here
- When heat is applied to a substance, the substance may change its state. Solids will melt into liquid. Liquids will change to gases and vapour. When heat is taken from a vapour, it cools down and condenses.
- Summary
- Electricity is a source of energy, which is very important to us. It is used for different purposes. Without electricity, we cannot light our rooms and we cannot see in the rooms especially at night. We use electricity to iron our clothes, watch television and cook.
- We also use it to cool our drinks and to preserve our food. We must handle electricity with care because it can harm us.

Assessment questions

1. Diagnostics
   i. The processes in which a solid changes into a liquid is known as …….
   ii. Liquids change into …….. when heated

2. Progressive.
   i. When vapour changes into liquid …….. was taken from it.
   ii. When ¼ Fanta bottle of water is heated and boiled, the remaining water is ……
   iii. When water boil, it change into ……

Answers to assessment question.

1. Diagnostic
   i. The processes in which a solid changes into a liquid is known as melting
   ii. Liquids change into gas or vapour when heated.

2. Progressive
   i. When vapour changes into liquid heat was taken from it.
   ii. When ¼ Fanta bottle of water is heated and boiled, the remaining water is
   iii. When water boils, it changes into vapour

Answers to Study Questions (Refer to LB pages 96 - 97)

1. Fill in the blank Spaces
   a. Gas
   b. Solid
   c. liquid
   d. liquid
2. Match the following processes with the correct explanation

Process	Explanation
Evaporation	Change of state from gas to liquid
Condensation	Change of state from solid to liquid
Freezing	Change of state from liquid to gas
Melting	Change of state from liquid to solid

3. For each of the following changes, indicate whether heat is added or heat is taken out from the initial substance.
   i. A solid changing to liquid
   ii. A liquid changing to gas
   iii. A gas changing to liquid
   iv. A liquid changing to solid

Diagnostic assessment for facilitator

1. Are you sure that you have presented the lesson in the right order?
2. Were you able to demonstrate the change of state of substances to the learners?
3. Could you say that you managed the time well?
4. What aspect of your lesson engaged the learners in critical thinking?

STRAND 4: FORCES AND ENERGY.

SUB-STRAND 2: ELECTRICITY AND ELECTRONICS

LESSON 15: USES OF ELECTRICITY

Reference: Learner's Book pages 98 - 103

Expected Learning Outcomes

- Identify everyday practices that lead to wastage of electricity
- Analyse the effect of electricity wastage
- Explain measures to prevent the wastage of electricity

Content Standards: B4. 4.2.1.1. Demonstrate knowledge of generation of electricity, its transformation and transformation into other forms.

Indicators: B4.4.2.1.1. Identify use of electricity.

Core Competencies: digital literacy, creativity, and innovation, personal development and leadership, communication and collaboration, critical thinking and problem solving.

Subject Specific Practices: Analysing, generalising, communicating, manipulating, recording.

Introduction.

Electricity is a form of energy, it is obtained by the conversion of other forms of energy into electrical energy. A home without electrical energy will not attract people. The question is why will that be so? What is electricity use for? It is used to light the dark areas of the rooms especially during the night. Without electricity, one cannot see at night, they cannot iron school uniforms, they cannot preserve vegetables and fruits. Some people use electricity to cook. This means that without electricity one cannot prepare food. This could be a serious event since everybody needs food to survive.

Key Words: fatal, shock, plug, energy, electricity

Additional information

Electricity is very important for modern living. Without this convenient form of energy, communication will become a problem. The use of mobile phones enables communication to be fast. The use of laptops and desk tops and in fact all communication gadgets including the use of internet enable easy flow of information all over the world. This is possible because of electricity. The gadgets can easily be charged and the energies of their batteries restored after use.

We use electricity to iron our clothes, charge our vehicle batteries, run our refrigerators and deep freezers. Electricity makes life easier. We watch television, listen to radio and these broaden our horizon.

Materials and resources (low and no cost): Diagrams and charts of electrical gadgets and appliances, pressing iron, television set, radio, electric cookers, mobile phones, immersion heater.

Procedure
Begin lesson by asking learners to name the electrical appliances used for the following activities in the house.

- Ironing clothes and school uniforms
- Provision of light
- Charging of mobile phones
- Cooking food
- Heating water.

Learners name the appliances used one after the other.
Ask learners to discuss among themselves how they feel without electricity. Learners discuss among themselves and to the class as a whole.

Activity 4.2.1.1 Drawing things that use electricity at home and school.
Ask learners to draw gadgets and appliance used in the home and school that use electricity in their note books.
Move from table to table to see how they do it and guides them.

***Project**: Generation of electricity using a fruit. (Fruit cell)*

In their groups, learners are directed to generate electricity using a fruit of their choice such as lime, lemon, orange, apple and a tuber of potato.

Ask learners to bring a fruit of their choice to school.
Provide learners with short pieces of zinc and copper rods such as electrodes with short pieces of copper wire.

Obtain a galvanometer from a Senior High School Physics Laboratory. The two electrodes are inserted into the fruit such that they are as wide apart as possible. They are then connected with the pieces of copper wire is the galvanometer.

Demonstrate this activity for learners to try among their groups.
The pointer of the galvanometer will deflect showing the fruit as a source of electricity.
Move among learners to observe and help them perform the activity. Guide learners.

Summary

- Electricity is a source of energy, which is very important to us. It is used for different purposes.
- Without electricity, we cannot light our rooms and we cannot see in the rooms especially at night.
- We use electricity to iron our clothes, watch television and cook.
- We also use it to cool our drinks and to preserve our food.
- We must handle electricity with care because it can harm us.

Assessment questions

1. Diagnostic
   i. Electricity in the home is obtained from which source?
   ii. What will modern living look like without electricity?

2. Progressive
   i. Name two things that one uses electricity for in the home.
   ii. Name one fruit that can be used to generate electricity.

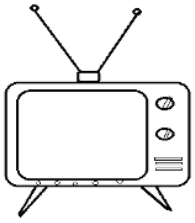
Answers to assessment questions.

1. Diagnostic
   i. From the national grid.
   ii. Life will be boring and not interesting.

2. Progressive.
   i. Ironing, watching TV. Light, heating water, cooking food.
   ii. Lime, lemon, orange, tomatoes, apple.

Answers to Study Questions (Refer to LB page 103)

1.
   a. Bank=Computer, lamp, microphone(any one)
   b. Hospital=refrigerator, lamp, x-ray machine(any one)
   c. Church=organ, lamp, microscope, electric drum, amplifier, mixer(any one)
   d. Restaurant=deep freezer, lamp(any one)
   e. Laundry = washing machine, pressing iron(any one)
2. TV, ceiling fan, Sound system, Computer, light bulb
3. Accept any correct drawing



Diagnostic assessment for facilitator

1. Did you share learning expectations with learners?
2. What did you do to make sure that the learners display creative skills?
3. Did you create the atmosphere for the learners to discuss among themselves?
4. Did you emphasise to learners precautions to be taken when using electrical appliances?

STRAND 4: FORCES AND ENERGY
SUB-STRAND 2: ELECTRICITY AND ELECTRONICS

LESSON 16: ELECTRICITY CONSERVATION

Reference: Learner's Book pages 104 - 108

Content Standard: B4.4.2.1 Demonstrate knowledge of generation of electricity, its transmission and transformation into other forms

Indicator: B4.4.2.1.2. describe ways of conserving electricity.

Core Competencies: Personal Development and leadership, Cultural identity and Global Citizenship, Communication and Collaboration. Critical Thinking and ProblemSolving

Subject Specific Practices: Observing; Analysing; Evaluating Generalising, Communicating Interpreting, Measuring Generalising, Recording

Introduction
There are many things that we do at home that involves the use of electricity. Productions and distribution of electricity is expensive. We need to conserve electricity.

Additional information
We have learnt that electricity is generated by converting one form of energy to electrical energy. The processes are not easily obtainable. For example, in the hydro power generation, a dam should be constructed at a convenient site in a river at a great cost. It also requires regular rainfall which humans cannot control. For this reasons electrical energy should not be wasted in the home or elsewhere but should be conserved. Electricity is purchased at a cost and therefore should be conserved. What should we do to conserve electricity? That is what we have to think about and implement in our homes and schools.

Materials and resources (low or no cost):
Procedure

- Begin lesson by asking learners a few questions such as:
- Do your parents switch off lights, television sets and other gadgets and equipment when leaving the house in the morning?
- Listen to the responses of learners and that will form the basis of the discussion.
- Why do they switch them off?
- Learners will answer. Some will come out with the fact that for conservation of energy.
- Lead the discussion on the possible outcomes of leaving the lights and appliances on when their parents go out in the morning.
- It causes wastage of electricity which is not cheat to obtain. Another reason is the gadgets and appliances many become so hot that it can lead to fire burning the house down.

Ask learners in their groups to discuss activities that lead to wastage of electricity. Learners will mention the following:

- Leaving lights on when it is not being used.
- Switching television and other electrical appliances on when leaving the home.
- Using appliances that are not energy efficient.
- Ironing items one by one and not in bulk

Listen to learners discuss on activities that contribute to wastage of electricity. Ask learners what they will do so that they will not waste electricity in the house and school.

Activity 4.2.1.2. Reducing the amount of electricity consume at home in three months.
Learners are requested to find out from their parents in the house how much electricity they purchase over one month period. This is then multiplied by three to know how much electricity they use in three months. Learners bring their findings for discussion in class.
Learners mention activities that will help conserve electricity in the home.
Activities such as

- Putting off lights when not being used.
- Switching all electrical appliances off when leaving the home.
- Using energy saving appliance and lights.
- Ironing in bulk
- Not over charging gadgets such as phones and laptops.

Summary

- Electricity is generated at a high cost and transported at a cost to homes and other public places. It must be used in such a way that it is not wasted.
- When electricity is wasted, the whole country is affected and we may have unnecessary power cuts.
- We should do everything not to waste electricity and rather conserve it.
- When gadgets are left on for a long time, they become hot and can cause fire outbreak. We should put all gadgets off when they are not in use.

Assessment questions.

1. Diagnostic.
    i. Name the type of energy used commonly in the home
    ii. State one way by which this energy is wasted as far as ironing of cloths is concerned.
2. Progressive.
    i. State two things one has to do to conserve electricity in the home.
    ii. What are energy saving appliances?

Answers to assessment questions.

1. Diagnostic
    i. Electrical energy
    ii. Many people iron one cloth at a time instead of ironing in bulk.

2. Progressive.
   i. Put off lights when not being used.
      Iron in bulk instead of one by one
      Use energy efficient gadgets
      Do not overcharge electrical appliances.
   ii. Appliances that are efficient and do not waste electricity

Answers to Study Questions (Refer to LB page 108)

1.
   - Iron in bulk,
   - Put off light when not in use,
   - Do not put on radio and television set at the same time,
   - Put off deep freezer when ironing clothes.

2. The chart below shows the electricity bill used by Mr Mensah's family for one month. Study the bill and answer the questions

Month	GH₵
January	200
February	100
March	305
April	180

   i. March
   ii. February
   iii. 200+100+ 305= GH¢ 605.00
   iv. Iron in bulk,
      Put off light when not in use,
      Do not put on radio and television set at the same time,
      Put off deep freezer when ironing clothes.
      (Any 3)

3. Say whether the following practices are good or bad in terms of usage of electricity
   i. Good
   ii. Not good
   iii. Not good
   iv. Not very good
   v. Good

Diagnostic assessment for facilitator

1. At the end of the lesson did the learners know the importance of conserving electricity in their home?
2. Did you observe how the learners communicate and collaborate among themselves when they were in groups?
3. How did you conclude the lesson?

STRAND 4: FORCES AND ENERGY
SUB-STRAND 2: ELECTRICITY AND ELECTRONICS

LESSON 17: BASIC COMPONENTS OF ELECTRONIC CIRCUITS AND THEIR FUNCTIONS

Reference: Learner's Book pages 109 - 114

Expected Learning Outcomes

- know the names of basic electronic components
- describe the uses of each component
- know how to construct electronic circuits

Content Standards: B4. 4.2.2.1. Know the functions and assemblage of basic electronic components.

Indicator: B4. 4.2.2.1. Identify the basic components of electronic circuits.

Core Competencies: Digital literacy, personal development and leadership, communication and collaboration, critical thinking and problem solving, creativity and innovation.

Subject Specific Practices: Observing, manipulating, analysis, generalising, communicating.

Introduction

Electronics is the study of the behaviour of the electrons in the outermost shells of semiconductors. Semi-conductors are elements which have four electrons in their outermost shell. If one of the electrons is the outermost shell is removed either by heat or function, a hole is created. As electrons are observed to move to one side, holes move in the opposite direction. Electrons and holes are thus the charge carriers in semi-conductors. Electrons are negative charge carriers and holes are positive charge. Electronic components are built using semi-conductors which are either p-type or N-type. P-type and N-type components are combined to make other materials such as P-N junction diodes, light emitting diodes, transistors and other components.

In all electronic circuit the main source of energy used is cell or a combination of cells called battery.

Key Words: gadgets, switch, diodes,

Additional Information

The electronic circuit is the arrangement of components with a source of energy and a switch. The components such as the light emitting diode (LED) converts electrical energy into light

energy. There are several colours of LED depending on where the electrons and holes move to or from before coming back to their original position. The colour of the LED depends on the energy difference between the acquired energy level and the previous level to which the electron had been moved to. Connecting electronic components requires some skill. The components are constructed such that they can easily be identified and the proper connection made.
Materials and resources (low and no cost): LED (different colours, yellow, green, red), connecting wires, cells, carbon, resistor, capacitor.

Starting the lesson
Procedure

- Begin lesson by providing learners with connecting wires, batteries (dry cells), switches and different colours of light emitting diodes in their groups.
- Lead learners to identify the various components by pointing at them and naming them one after the other.
- Lead and demonstrated how to connect a simple circuit diagram to light the lead.
- Remember that the positive terminal of the battery is connected to the longer base of the light emitting diode whilst the negative terminal of the battery is connected to the switch and then to shorter lead of the light emitting diode of shown in the circuit diagram below.

Activity 4.2.2.1 (c) connecting electronic components in a simple circuit.
Let learners, in groups, connect the circuit diagram as you demonstrate it to them. One member of the group switches on the circuit. The group members discuss their observation.

Learners discuss the roles of the components in the circuit.

Learners are encouraged to draw the circuit diagram they have connected in their note books.

Learners are asked to name other sources of electricity. Fruits such as lemon and lime with metals can be a source of electricity.

Instead of metallic wires which can easily carry electronic current, solutions of salts, acids and bases can also carry electricity. Graphite in pencils can also carry electrons. Despite their ability to carry electrons, metallic wires are better.

Activity 4.2.2.1 (d). To role play the action of electrons in a circuit. (Class activity)
Lead learners to role-play how electrons are transported in electronic circuits. This activity is discussed in their text book page45.

Activity 4.2.2.1 (e) building a stock of electronic component.
Encourage leaners to visit a radio or television repairer. They should go in their groups to different repairers.

They should ask the repairers to give them old electronic components such as resistors, capacitors, inductors, cells, connecting wires, transistors to be brought to the classroom.
On the other hand, they should be given old radios and TVs and they look for the components.
The components should be placed on a table in the corner of the classroom.
This is a stock of electronic components.

Summary

- There are basic components of an electronic circuit which include: connecting wires, capacitors, resistors and light emitting diodes.
- These components with cells can be used to connect a simple electronic circuit.
- When connected well, it makes a light emitting diode to light up when the circuit is closed.

Assessment questions.

1. Diagnostic
    i. State the function of a battery in an electronic circuit.
    ii. What does a switch do in an electronic circuit?

2. Progressive.
    i. Explain what happens when an electronic circuit is closed.
    ii. Name two other sources of electrical energy apart from cells and batteries.

Answers to assessment questions.

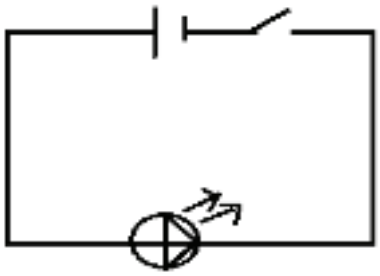
1. Diagnostic
    i. It provides energy in the circuit.
    ii. It controls the flow of electrons in the circuit by allowing them to pass or not to pass.

2. Progressive.
    i. Electrons move from the battery into the light emitting diode and the charge carried in the LED acquire the energy and converts it into light energy.
    ii. Fruits, acidic and bases.

Answers to Study Questions (Refer to LB page 114)

1.
   - Cells (battery) ,
   - Connecting wires,
   - Switch,
   - Light emitting diode

2. i. A witch.
   ii. Connecting wires
   iii. Light emitting diode
   iv. Cell or battery

3. 

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 2: ELECTRICITY AND ELECTRONICS

LESSON 18: ELASTIC AND COMPRESSIONAL FORCES

Reference: Learner's Book pages 115 - 121

Expected Learning Outcomes

- Mention common examples of forces
- Distinguish between elastic and compressional forces
- Explain the applications of elastic and compressional forces

Content Standard: B4. 4.3.1.1. Know that movement is caused by applied forces due to the releases of stored energy.

Indicator: B4.4.3.1.1 Demonstrate understanding of elastic and compressional forces and their everyday applications.

Core Competencies: Cultural identity and Global citizenship, personal development and leadership, communication and collaboration, critical thinking and problem solving.

Subject Specific Practices: Observing, manipulating and predicting, analysing, generalising and communicating.

Introduction

You have learnt that a force is a push or pull which causes a stationary object to start moving, a moving object to stop, a moving object to change its direction, increase or decrease its speed and for an elastic object to change its shape. All these are the efforts of a force on an object. In this lesson, we will learn about elastic and compressional forces.

Key Words: compressional, elastic, tensional

Catapult

rubber band

springs.

Materials and resources (low or no cost): Table, football, chart illustrating the following items. Catapult, rubber stopper, springs, bicycle pumps, toy cars.

Procedure

- Begin lesson by asking learners to define force, listens to the definition and help in correcting if the need arises.
- Show learners the chart illustrating items with which forces can be exerted.

Activity 4.3.1.1 (i) (a) to show the effect of force on an object. Kicking a football.

- In their groups, learners with a football show the effect of kicking a football on the ball. Learners discuss what happens to the football when kicked. The ball moves.

Activity 4.3.1.1 (i) (b) pushing a table

- In the group, learners observe how one of them pushes or table and the effect on the table.
- Learners discuss the effect of pushing the table on the table.
- Ask learners to state their observation. The table moves away from the one who pushed it.

Activity 4.3.1.1 (i) (c) crumpling a piece of paper.

- One learner should lead and crumple a piece of paper and place it on the table for observation. The paper crumples and when left started to come out again. Learners discuss this observation.

Activity 4.3.1.1 (i) (d) switching on a toy car

- One member of the group switched on a toy car. Another member placed a book on its way. Observation: when switched on, the toy car starts to move. When a notebook is placed on its way, it stops moving. Learners discuss their observation. Discuss the effects of force on a body.
- Activity to demonstrate elastic and compressional forces

Activity 4.3.1.1 (ii) (a) demonstration of elastic force

- Resources needed: Catapult.
- One member of the group uses a catapult. The member stretches the catapult and the rubber extends because a force has been exerted on it.
- Members of the group discuss how the member felt. Lead learners to explain how the catapult can be used to kill birds.

Gymnasium force.

Demonstrate using a spring.

- Push the coils of the spring together. When the force is removed, the spring returns to its shape. This force is a compressional force.
- A bicycle pump also exerts such force when the player is pushed into the barrel. The air in the pump or barrel is compressed.
- Demonstrate this force for learners to observe.
- Lead the discussion on the uses of compressional and elastic forces.

- Use of catapult, rubber bands in elastic forces. Syringes, pumps use compressional forces.
- Learners discuss among themselves other ways by which these forces are used.

Summary

- Tension force is a pulling force applied to an object to make the object stretch.
- Compression Force is a force that is applied to an object to make the object shrink.
- These forces are used in making some objects around us.
- Examples of objects that have these forces are: catapult, rubber ball, spiral spring, spring in mattresses and trap doors.

Assessment questions.

1. Diagnostic
   i. A man took his car which was involved in an accident to a welder's shop to work on it.
   ii. Name the type of forces which will be observed as the welder starts to work on the car.
2. Progressive.
   i. State the effect of forces that can be identified when the welder begins to work on the car which was involved in the accident.

Answers to assessment questions.

1. Diagnostic
   i. Push, pull, friction
2. Progressive
   i. Movement, compression change in shape, the body from movement.

Answers to Study Questions (Refer to LB page 121)

1. It is a force that exists in an extensible material
2. i. False ii. True iii. False iv. False v. True
3. • Rubber band stretched
   • Spring compressed
   • Crumpled piece of paper
4. A catapult is stretched by applying a force. The tension increases. When the force is reduced, the tension force throws the stone

Diagnostic assessment for facilitator

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

SUB-STRAND 1: PERSONAL HYGIENE AND SANITATION

LESSON 19: KEEPING OURSELVES AND THE ENVIRONMENT CLEAN

Reference: Learner's Book pages 123 - 127

Expected Learning Outcomes

- Identify unhealthy sanitation practices
- Analyse the effect of unhealthy sanitation practices on the environment and personal health
- Explain ways of keeping the body and environment clean

Content Standards: B4.5.1.1 Recognise the importance of personal hygiene

Indicators: B4.5.1.1.1 Know how to care for one's self and the environment.

Core Competencies : Critical thinking and Problem-Solving, Collaboration and communication, Personal Development and Leadership

Subject Specific Practices: Analysing, Predicting, Evaluating
New Words: dysentery, diarrhoea

Introduction

The learner understands the fact that the natural home of a group of living things or a single living thing is called Habitat. Humans are not left out. Humans form part of an ecosystem. This understanding should create awareness about the environment we live in. Caring for ourselves and the environment we live in becomes an important issue to consider.

Key Words: dysentery, diarrhoea, hygiene, sanitation, typhoid, decay

Additional Information

Whatever we do in our environment affects us positively or negatively. Destroying the environment means destroying ourselves. Caring for the environment meant caring for ourselves. This draws our attention to the issue of personal hygiene. 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 in clean water.
- Cleaning our teeth
- Bathing
- Keeping our fingernails 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.

In your groups (four or five in a group), brainstorm and share ideas with the whole class on what you do to maintain personal hygiene.

In your groups write your ideas on flashcards.

Do the things you wrote on your flash card include bathing twice daily? Do they include cleaning the teeth, cutting your fingernails, washing your towels and sweeping your classroom? What do you think will happen to you if you do not take good care of your body?

Lead learners to brainstorm and explain what will happen to you if you do not take good care of your body.

Activity 1.1.1: Investigating materials that can be used to enhance personal hygiene
Materials/Resources (Low or no cost):
Procedure
Tell learners, in groups of four or five, to investigate and write materials that can be used to enhance personal hygiene.
Tell learners, in groups of four or five, to write down the materials they use to

- brush their teeth.
- clean the armpit.
- bath.

Summary
Personal hygiene is important to us because if we practice personal hygiene we will be healthy and strong.

Diagnostic Assessment
Name two things each that you use to
(a) brush your teeth.
(b) bath.

Progressive Assessment
Write down what you will use instead of the following items to nachieve the same purpose
(a) tooth brush
(b) nail cutter

Answers to Diagnostic Assessment
(a) Tooth paste and tooth brush.
(b) soap and sponge.

Answers to Progressive Assessment
(a) chewing stick
(b) razor blade

Answers to Study Questions (Refer to LB page 127)

1.
    i. Twice
    ii. Clean
    iii. Cholera
    iv. Ring worm
    v. Fingernails
2. Kofi is a dirty boy. He doesn't bath regularly and always has unkempt and bushy hair.
    i. skin rashes
    ii. What 3 suggestions will you give to Kofi to prevent him from getting sick?
        - Wash his hands with soap and rinsing them in clean water.

- Cleaning teeth
- Bathing twice a day
- Keeping our fingernails short and clean.
- Washing and taking good care of his hair.
- Washing and drying his clothes.

Any 3

3. Accept any appropriate drawing

Diagnostic assessment for facilitator

1. Did every learner show keen interest in the lesson?
2. Did the learners realise the need for keeping their body and environment clean?
3. Did you observe any good communication and collaboration among each group members during the activity carried out?
4. What pedagogy did you use during this lesson?

STRAND 5: HUMANS AND THE ENVIRONMENT
SUB-STRAND 2: PERSONAL HYGIENE AND SANTITATION

LESSON 20: WASTE MANAGEMENT

Reference: Learner's Book pages 128 - 131

Expected Learning Outcomes
- Identify sources of waste within the environment
- Describe how waste can be managed within the community

Content Standards: B4.5.1.1 Recognise the importance of personal hygiene

Indicators: B4.5.1.1.2 Describe ways of sustaining the environment through waste management

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

Subject Specific Practices: Observing, Designing experiment, Analysing, Generalising, Generating

Introduction
Personal hygiene is the main issue considered in the previous lesson. In practicing personal hygiene, waste management is very important. In our daily activities, we generate waste. For example, when we buy bottled water, the empty bottle if not reused become a waste. It must be disposed of properly so that it does not affect the environment.

Key Words: facilities, Waste, sustain, manage,

Additional Information
We are living things. All living things interact with one another. That is, they help each other for survival. Germs are also living things. But they like to live in dirty and unclean places. Germs cause many diseases which make us sick. To prevent us from getting sick we must practice good sanitation. This means we must keep our body and surroundings clean so that germs cannot live and make us sick.

We must sustain the environment by not throwing rubbish and bad things around.
i. Sweep our living places (house, school) regularly.
ii. Clean gutters around our houses regularly.

Starting the lesson
Helps learners to watch pictures and videos on how to sustain the environment including separating waste.

Activity 5.1.1.2: Types of waste you produce in the home and at school
Materials/Resources (Low or no cost): paper, rubber, bottles, empty tins, waste food,
Procedure

i. Tell learners, in groups of four or five, to mention the types of waste they produce in the home and at school (e.g. paper, rubber, bottles)
   Write ideas of learners on the board.
   Ask learners, in groups of four or five, to state what will happen to the environment if the waste they produce is not separated
ii. In groups (four or five in a group), discuss different ways of keeping the compound clean as shown in the diagrams above.
iii. Why should we clean our gutters?
iv. Why should we sweep our compound?
v. Why should we clean our toilet facilities?

Now you have learnt ways of sustaining the environment.
In your own way, write down four practical ways of sustaining the environment.

> ***Project:*** *Tell learners, in groups of four or five, to design and make or mould litter bins from suitable materials for holding different types of waste.*

Summary
To prevent us from getting sick we must practice good sanitation. This means we must keep our body and surroundings clean so that germs cannot live and make us sick.

Diagnostic Assessment

1. Personal hygiene means keeping your surroundings clean. True or false?
2. Sanitation means keeping your body clean. True or false?
3. No matter how clean an environment is germs live there and make people fall sick. True or false?

4. Mention three places in your home that need to be kept clean

Progressive Assessment

1. Mention two ways by which waste is manages in your community
2. Mention three items that are found in the waste in your community

Answers to Diagnostic Assessment

1. False
2. False
3. False
4. Kitchen, toilet and bathroom

Answers to Progressive Assessment

1. Sweeping and putting rubbish into dustbins , Carrying rubbish into refuse dumps
2. Plastics, waste food and broken bottles

Answers to Study Questions (Refer to LB page 131)

1. metals, polythene, empty pure water sachet, plastic bottles, broken glasses, paper, waste food(rice, yam, cassava, plantain, fish, meat, oil, banku, fufu, stew, soup), leaves(cabbage, kontomre), plantain peels, pieces of old textile materials, hair, disposable packs, used toilet rolls, old pillows, old bed sheets, old shoes, old slippers,
   (Any 4)
2.
   i. by not throwing rubbish around.
   ii. by sweeping our living places (house, school) regularly.
   iii. by cleaning the gutters around our houses regularly.
   iv. by avoiding putting waste items such as mineral water sachets and bottles on the floor.
   v. by emptying dustbins in a rubbish dump when they are full
   Any 3
3. We must practice good sanitation in order to avoid sickness this means we must dispose rubbish in a safe manner. Rubbish must be dumped in litter bins and our compounds must be clean at all times.

Diagnostic assessment for facilitator

1. Did all the learners participate in any activity involving waste management?
2. Which aspect of the lesson brought about personal development?
3. Did you observe any good communication and collaboration among each group members during the activity carried out?
4. What home learning activity did you give to the learners?

SUB-STRAND 2: DISEASES

LESSON 21: MEASLES

Reference: Learner's Book pages 132 - 135

Expected Learning Outcomes

- Know the causes and symptoms of measles
- Explain how measles can be prevented

Content Standards: B4.5.2.1 Know common diseases of humans; causes, symptoms, effects and prevention

Indicators: B4.5.2.1.1 Identify causes, symptoms and prevention of measles

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

Subject Specific Practices: Analysing, Predicting, Evaluating

Introduction

The learner learnt in the previous lesson about waste management. He or she needs to know the link between this practice and common diseases that affect human. The consequence of not managing our waste materials properly is the outbreak of diseases. Measles is one of such diseases.

Key Words: contaminated, discomfort

Additional Information

There are common diseases of humans. Certain things cause these diseases. You can use the symptoms and the effects these diseases have on you to identify them. This can make you know how to prevent them. One of such diseases is measles. Viruses of diseases such measles are always in the air. When they fall on humans whose immune system is weak, they begin to grow. Rashes appear on the neck and behind the ears and later spread all over the body. These rashes are itchy and as they burst because of scratching. The rashes spread to other parts of the body. If not detected early and treated measles can be fatal.

You can get measles when you breathe in air contaminated by germs from infected persons when they talk, breath, cough and sneeze.

Other symptoms of measles include fever, tiredness, cough, sore throat, sore eye, runny nose, discomfort when looking at light.

Prevention of measles

We can prevent measles in many ways. Some of these ways include:

- Vaccination
- Isolate infected person
- Avoid contact with infected person
- Clothing should be clean and changed frequently.

You may also invite a health personnel or School Health Education Programme (SHEP) coordinator to give a talk on measles.

In pairs, answer the following questions based on the pictures and videos you have watched:

i. What causes measles?
ii. What are the symptoms of measles?
iii. What should be done if someone is exposed to measles?
iv. What are the ways of preventing the spread of measles?

A child taking a measles vaccine

Look at the skin of the child in the picture in figure... How does the skin look like? The child is suffering from a disease called measles. Measles is caused by a virus. As was stated earlier,

Project:*1. Develop concept maps to show the causes, symptoms and prevention of measles.*
2. Develop posters to talk about how you can prevent measles.

Summary
Measles is caused by a virus. Symptoms include rash on the neck and behind the ears which later spread all over the body. We can prevent measles by avoiding contact with infected persons.

Diagnostic Assessment
Ask learners to state three ways of preventing measles in their home

Progressive Assessment
What symptoms will you see on your classmate to know that he or she is suffering from measles? Mention any two of them

Answers to Diagnostic Assessment
We can prevent measles in the home by
- Vaccination
- Isolating infected persons
- Avoiding contact with infected person
- Wearing clean clothes

Answers to Progressive Assessment
Rashes appear on the neck and behind the ears
Rashes are itchy and as they burst because of scratching.
Rashes spread to other parts of the body. Any 2

Answers to Study Questions (Refer to LB page 135)
1. Answer the following questions on Measles.
   a. virus
   b. Fever, tiredness, cough, sore throat, sore eye, runny nose, discomfort when looking at light.
   c. The person exposed to the measles must be isolated. The people around him or her should be vaccinated. People must not wear the same clothes with the infected person
2. (i) False (ii) True (iii) True (iv) True (v) False.
3.
   - To isolate infected person
   - To avoid contact with infected persons
   - To avoid wearing the same clothes with infected person
   - To wear clean clothes and change them frequently.

Diagnostic assessment for facilitator

1. Did you use any relevant previous knowledge to present this lesson?
2. Before you started this lesson how did you examine the skin of learners to see if there was any skin disease?
3. What pedagogy did you use to present this lesson?

STRAND 5: STRAND 5: HUMANS AND THE ENVIRONMENT
SUB-STRAND 2: DISEASES

LESSON 22: SOME COMMON FOOD-BORNE DISEASES

Reference: Learner's Book pages 136 - 140

Expected Learning Outcomes

- Know what a food-borne disease is
- Identify common food-borne diseases based and their symptoms
- Explain how to avoid getting infected with food-borne diseases

Content Standards: B4.5.2.1 Know common diseases of humans; causes, symptoms, effects and prevention

Indicators: B4.5.2.1.2. Demonstrate understanding of the causes, symptoms and prevention of food-borne diseases

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

Subject Specific Practices: Observing, Evaluating, Generating, Analysing

Introduction

The previous lesson deals with measles. Measles is not the only disease that affects humans. There are other diseases. Some of the diseases are caused by germs in the food we eat. These germs come from the environment. To prevent these germs from entering our food, we need to issues of personal hygiene seriously.

Key words: cholera, diarrhea, typhoid fever, food-borne diseases, causes, symptoms and prevention , Food-borne, vaccination,secretions

Additional Information

There are many diseases which affect humans. Each disease has something which causes it. Diseases which are caused by germs attack humans either through the air they breathe, the food they eat, the water they drink or the things their body comes into contact with. Some common diseases which affect humans through food are called food-borne diseases. There are certain things that cause these diseases. These diseases also produce symptoms. These diseases can also be prevented if you know what causes them. Some food-borne diseases include cholera, diarrhoea and typhoid fever.

Cholera

It 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.

A person who has cholera:

- suffers severe diarrhoea(watery stool)
- vomits
- suffers abdominal pains

Typhoid

It is caused by a bacterium called Salmonella typhi

It can be obtained from food or water contaminated by faeces of an infected person just like cholera.

A person who has typhoid:

- has mild fever(body pains)
- has abdominal pains with constipation(inability to have free bowels)
- may have diarrhea if not treated early

You can prevent food-borne diseases by the following ways:

- eating hot food
- covering food

- vaccination
- washing hands always with soap before eating
- safe disposal of sewage
- purification of water supplies



Starting the lesson

- Start this lesson by asking learners the food they ate before coming to class. , ask learners whether it is possible for them to get diseases through food.
- Show video or pictures on causes, symptoms and prevention of food borne diseases to learners to watch. Some of the video can be obtained on u-tube from the internet. You can therefore use Google or any internet search engine and type the topic and select video to watch
- Direct learners to page 136 of pupils textbook 4
- Invite a health personnel, SHEP coordinator or personnel from the Food and Drugs Authority (FDA) to give a talk on food-borne diseases to learners.

Activity 5.2.1.2: Answering questions on food-borne diseases
Materials/Resources (Low or no cost): no material required
Procedure

- Let learners pair themselves up and each pair is made to answer the following questions:
  i. What causes food-borne diseases?
  ii. What are the symptoms of food-borne diseases?
  iii. What should be done if someone contracts a food-borne disease?
  iv. What are some examples of food-borne diseases in your localities?
- Tell each pair of learners to write down answers to the above questions.
- Tell each pair of learner to volunteer or choses any pair at random to read the answers to the questions they have written down to the whole class for discussion.
- Evaluate the answers of learners by giving them project work to prepare posters on the prevention and control of food-borne diseases.

Summary

- Some diseases affect humans through the eating of contaminated food.
- Some food-borne diseases include cholera, diarrhoea and typhoid fever.

Diagnostic Assessment

Name two diseases which can affect humans by eating contaminated food

Progressive Assessment

i. Akua likes eating cold food. She prefers drinking cold tea even if the weather is cold. Her brother Kweku always eat hot food. There was cholera outbreak in their community. The two of them were affected by the disease. How possible could this be?

ii. One of your classmates was absent from school. When you tried to find out why, you were told he or she had cholera. What do you think people might have seen to conclude he or she had cholera?

Answers to Diagnostic Assessment

Typhoid and cholera

Answers to Progressive Assessment

i. Apart from eating hot food, it is important to wash your hands with soap and water. It is likely Kweku had not been washing her hands well with soap before eating. As for Akua, it is obvious she got it from either eating the cold food or by not washing her hands well with soap.

ii. mild fever, abdominal pains with constipation, vomiting and diarrhea

Answers to Study Questions (Refer to LB page 140)

1. Diarrhoea, cholera and typhoid
2. (i) severe diarrhoea(watery stool) and vomiting
   (ii) mild fever(body pains) and has abdominal pains with constipation(inability to have free bowels)
3. The spread of cholera can prevented by:
   - eating hot food
   - covering food
   - vaccination
   - washing hands always with soap before eating
   - safe disposal of sewage
   - purification of water supplies

   (Any 4)

Diagnostic assessment for facilitator

1. How did you arouse the interest of the learners in the lesson?
2. Did you make the learner realise their personal responsibility of avoiding food-borne disease?
3. What subject specific practice came out during your lesson presentation?
4. What personal development can you point out as coming out in your lesson?

STRAND 5: HUMANS AND THE ENVIRONMENT

SUB-STRAND 3: CLIMATIC CHANGE

LESSON 23: THE DANGERS POSED BY BURNING TO THE ENVIRONMENT

Reference: Learner's Book pages 141 - 145

Expected Learning Outcomes

- Give reasons why people burn vegetation or set things on fire
- Explain the effect of burning on people's health and the environment

Content Standards: Know that climate change is one of the most important environmental issues facing the world today.

Indicator: B4.5.4.1.1. Explain that burning is one of the causes of climate change.

Core competencies: critical thinking and problem solving collaboration and communication, personal development and leadership, creativity and innovation.

Subject Specific Practices: observing, predictions, evaluating, analysing, generalising.

Introduction.

We burn rubbish in our homes every day, some of us burn our used toilet materials. Anything that is not important to us should be burnt. Hunters want to kill animals for food they must burn the bush which harbours them so that they can run out for them the kill them. Burning has become everyday activity. Whatever happens to the smoke is not our concern. We are ignorant about the effect of the burning on our environment. We import over age vehicles which produce a lot of smoke. Our factories produce smoke. Smoke is less dense than air so it goes above air and can be carried everywhere. Burning produces carbon dioxide and carbon monoxide. Carbon monoxide can easily be inhaled and has fatal effects on humans.

Key Words: Atmospheric, greenhouse, humus, fossil fuel,

Additional information

Carbon dioxide is produced with carbon monoxide when things are burnt. Burning of fossil fuels in industries and vehicles produce other gases such as sulphur dioxide and lead dioxides. All these gases cause environmental pollution. Carbon dioxide is a greenhouse gas. It forms a shield round the earth and prevents heat radiations from escaping into space. It causes the atmospheric temperature to rise. The rise in temperature causes global warming. This causes ice to melt at the poles and ice caps. The water produced from melting of ice flows into the sea.

The volume of sea water increases and washes back onto the land. Low lands become flooded and homes as well as farms become affected by the floods.
Sulphur dioxide and lead dioxide dissolve in rain water and fall as acid rain, which also had damaging effects on the rivers and forests.

Materials and resources (low or no cost): Video, diagrams on bushfires, smoky vehicles, burning firewood.

Starting the lesson

- Begin less by asking learners about bush burning and smoky vehicles.
- Show learners activities involving burning on Charts and video.
- Describe activities of hunters looking for game. Explain to learners that this can lead to burning of whole communities and soil organisms. Emphasize to learners also that bushfires can also destroy houses and properties of humans.

Activity 5.4.1.1 (a) A story about bush fire.
Lead learners to tell stories about burning activities they have witnessed or stories they have heard about burning.

Activity 5.4.1.1 (b) effects of burning.

- Lead learners to discuss the effect of burning. Let this be done in their groups.
- Listen as learners discuss about smoke travelling long distances away from the burning site. The gases produced in burning such as carbon dioxide, carbon monoxide, sulphur dioxide and lead dioxide.

- Lead learners to discuss the effects of these gases on the environment as follows: (i)
  i. Carbon monoxide affects breathing.
  ii. (ii) Carbon dioxide forms a shield around the earth and prevents heat radiation from escaping.
  iii. (iii) Sulphur dioxide dissolves in rain water to produce an acid rain which poisons life in water.
  iv. (iv) All these cause climate change, temperature rise, ice melts, and sear levels rise causing flooding in some area. The land is affected, drought is experienced at some areas more often and heavy rains fall at other areas.

Project: *in your groups obtain card boards to write posters on the effects of burning on climate change. Posters should have the following.*

Summary

- Burning is done on daily basis in all homes.
- Waste materials are burnt and fuels are used for cooking.
- Vehicles use fuel to make their engines work and they produce smoke.
- Hunters and farmers set bush fires for different purposes.
- All these produce harmful effects on the environment.
- Carbon dioxide, which is a greenhouse gas, is produced.
- This prevents heat radiations from escaping from the atmosphere. It leads to high atmospheric temperature.
- Living things in the soil are also killed, and that leads to infertility of the soil.

Answers to study Questions (Refer to LB page 145)

1.
   - Burning produces smoke which contains carbon dioxide which is poisonous at high concentrations.
   - Smoke contains soot which makes the environment dirty.
   - Carbon dioxide is a greenhouse gas and causes the environment to become hot.
2. a. Their homes are destroyed and some may be killed
   b. They get burnt
   c. It becomes dirty and poisonous
   d. It becomes warmer
3. Burning produces smoke. The smoke then moves up the air. It then spreads and travel long distances. Since the smoke is always hot and contains carbon dioxide it makes the earth warmer. This results in climate change.
4. Bush burning kills micro-organisms which cause decay of materials in the soil. When burnt, the soil loses its fertility

Diagnostic assessment for facilitator

1. Did you identify any element of global citizenship and cultural identity exhibited by the learners during their group discussion?
2. Did every learner realise the importance of environmental issues facing the world?
3. Did the learners realise they can also contribute positively or negatively to environmental issues?
4. Did the learners show curiosity to know more about issues of the environment when they watched the video or chart about the environment?

APPENDIX

ANSWERS TO WORKBOOK

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

LESSON 1: CHARACTERISTICS OF DIFFERENT GROUPS OF ANIMALS
(Refer to Workbook Pages 2 - 5)

B4.1.1.1.1: Classify animals into insects, birds, mammals and reptiles

PART A

1. c
2. c
3. b
4. a
5. a

PART B

1. Humans are **mammals**. Other animals such as dogs, cats, goats and horses are also **mammals**. All **mammals** drink **milk** from their mothers when they are **babies**. Most **mammals** have **hairs** on their bodies.
2. State whether the following statements are true or false by ticking the right box
   i. A frog is a reptile. True [ ] False [√]
   ii. Whales and dolphins are mammals True [√] False [ ]
   iii. A toad is an amphibian because it lives only in water True [ ] False [√]
   iv. Insects are invertebrates True [√] False [ ]
   v. Most mammals have hairs on their bodies True [√] False [ ]
3.
   i. Human being: Hairs on the skin, drink milk from their mothers when they are babies
   ii. Mosquito: Body divided into three divisions, It also has three pairs of legs(six legs)
   iii. Duck: have feathers, they are alsi born out of eggs having hard shells
   iv. Frog: they breathe with gills like a fish when young, they breathe with gills when old

4.
   i. Donkey= mammal
   ii. Ostrich=bird
   iii. Beetle= insect
   iv. Lizard= reptile
   v. Toad =amphibian
   vi.

LESSON 2: LIFE PROCESSES OF ALL LIVING THINGS (Refer to Workbook Pages 6 - 9)

B4.1.1.1.2. Know life processes of animals (movement, nutrition and reproduction)

PART A

1. c
2. a
3. b
4. a
5. d

PART B

1.
   i. Goat= Gives birth to young ones alive
   ii. Fowl= lays eggs
   iii. Cat= Gives birth to young ones alive
2.
   i. herrings = fins
   ii. camel= legs
   iii. Guinea fowl= legs and wings

3. How do the following animals move?
   i. Red fish= swim
   ii. horse=gallop
   iii. Guinea fowl= walk, fly
   iv. Toad= crawl

4.

G	**R**	**A**	**S**	**S**	**G**
M	A	N	K	L	**O**
C	A	S	S	**V**	**A**
A	Q	N	K	**U**	**T**
R	**R**	**A**	**T**	**L**	**D**
C	A	K	E	**T**	**O**
A	X	E	A	**U**	**G**
S	H	J	K	R	M
S	**B**	**O**	**N**	**E**	B

i. Goat
ii. grass
iii. Dog
iv. bone
v. Vulture
vi. carcass
vii. Rat
viii. grass

LESSON 3: TYPES OF PLANTS (Refer to Workbook Pages 10 - 13)

B4.1.1.2.2. Describe the physical appearance of different types of plants (trees, shrubs, climbing, creeping)

PART A

1. c
2. b
3. b
4. d
5. d

PART B

1.
   i. Rose plant is a tree. True [ ] False [√]
   ii. Cocoa plant is a tree. True [√] False [ ]
   iii. Hibiscus is an example of creeping plant. True [ ] False [√]
   iv. Cassava is an example of a shrub. True [ ] False [√]
2. Note: The facilitator to use his or her discretion with respect to the diagram
3.
   i. tree= the mango tree, nim tree and orange tree, Mahogany tree and the Odum tree (any one)

ii. shrub= Hibiscus plant, sunflower and rose (any one)
iii. climbing plant= Yam, climbing bean plant (any one)
iv. creeping plant= sweet potatoes, some kinds of grass, watermelon (any one)

4.

H	A	W	A	Y	A	T	A
O	**I**	W	U	Y	D	C	T
R	W	**B**	U	Y	D	C	A
A	W	M	**I**	Y	D	C	**Y**
N	**C**	**A**	**S**	**S**	**A**	**V**	**A**
G	W	N	U	Y	**C**	C	**M**
E	W	G	U	Y	D	**U**	A
T	**R**	**O**	**S**	**E**	D	D	**S**

i. Orange=Tree
ii. Rose=shrub
iii. Hibiscus=shrub
iv. Yam=climbing plant
v. Cassava=tree

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

LESSON 4: LIQUID-LIQUID MIXTURES AND THEIR SEPARATION (Refer to Workbook Pages 14 - 18)

B4.1.2.2.1: Identify a liquid-liquid mixture and describe how to separate its components

PART A

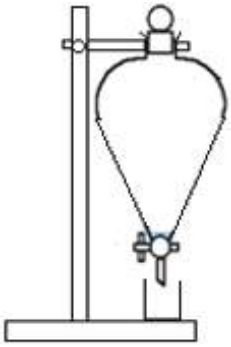
1. c
2. b
3. c
4. b
5. b

PART B

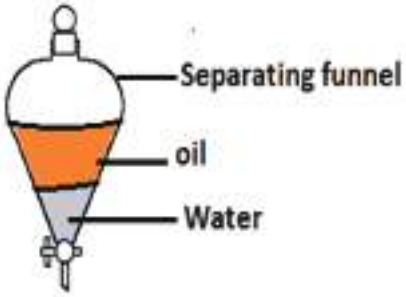
1. (a)
   i. palm nut soup = water and oil .
   ii. ground nut soup =water and oil
   (b) Name equipment that can be used to separate

i. two miscible liquids= distillation apparatus
ii. Two immiscible liquids= separating funnel

2. (a)
   i. Equipment that can be used to separate the mixture of the oil and water



   ii. The relative position of the two liquids in the equipment drawn in (i) just before the separation



   iii. Close the tap immediately all the water comes out of the separating funnel into the receiver.

3. Your teacher displayed mixtures in some transparent containers on his or her table.
   i. The one that has two layers will be the immiscible liquids
   ii. The one that has only one uniform layer will be the miscible liquid-liquid mixtures
   iii. Liquid-liquid mixtures: diesel and water, palm oil in coconut oil, ethanol in water.

STRAND 2 : CYCLES
SUB-STRAND 1: EARTH SCIENCE

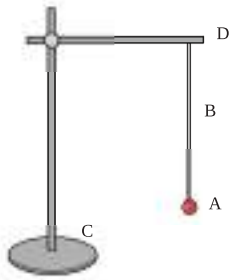
LESSON 5: CYCLIC MOVEMENTS IN THE ENVIRONMENT (Refer to Workbook Pages 20 - 24)

2.1.1.1 To demonstrate understanding of cyclic movement in the environment.

PART A

1. b
2. c
3. d
4. a
5. a

PART B



1.
   i. A = Bob or ball
   ii. B = String
   iii. C = Clamp stand or retort stand
   iv. D = Clamp
2. To show cyclic movements ie. movement that repeat themselves using a simple pendulum
3.
   i. second hand of an analogue clock
   ii. movement of a merry-go-round
4.
   i. Germination
   ii. Flowering
   iii. pollination
   iv. bearing of fruits
5. The germinate

LESSON 6: OBJECTS THAT ARE SEEN IN THE SKY (Refer to Workbook Pages 25 - 28)

B4. 2.1.2.1: Objects in the sky during day and night.

PART A

1. b
2. c
3. d
4. a
5. d

PART B

1. Cloud
2. Sun
3.
    i. Cloud
    ii. Moon
    iii. Stars
    iv. Sun
4. Sun
5. Sun, light
6. False
7. Moon, stars

LESSON 7: THE PROCESS OF EVAPOTRANSPIRATION (Refer to Workbook Pages 29 - 32)

B4.2.1.3.1: Demonstrate the process of evapo-transpiration.

PART A

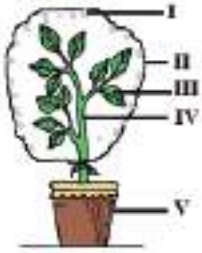
1. c
2. a
3. c
4. c
5. a

PART B

1.
   a. Evaporation is the process by which liquid in the form of vapour escapes into the atmosphere.
   b. Transpiration is the process by which water in the form of vapour escapes from the plant to the atmosphere.
   c. Evaporation involves any liquid escaping to the atmosphere in a form of vapour but transpiration involves only water escaping from a plant to the atmosphere in a form of vapour

2. An experiment to demonstrate evapo-transpiration
   - Obtain a young potted plant, plastic wrap bag and a rubber band.
   - Examine the surface of the leaves of the plants.
   - Mop off any water droplets on the surface of the leaves.
   - Tie the plastic wrap bag around the plant up to the stem and leave it for an hour.
   - Observe both plant and plastic wrap surfaces.
   - The presence of water droplets on the plastic wrap bag demonstrates evapo-transpiration

3. (a)Name the parts of the set-up labelled I to V



   i. I = water droplet
   ii. II = polythene bag
   iii. III = Leaf
   iv. IV = Stem of potted plant
   v. V = Flower pot

(b) (i) It comes from III(leaf) which evaporated and condensed
(ii) It enclosed the plant and provided surface on which water vapour condensed
(iii) I comes from III in a form of vapour which condensed
(iv) It enclosed the plant and provided surface on which water vapour condensed

4. (a) A lot evapotranspiration due to a lot of trees in the forest
(b) Plant more trees. Stop felling trees.
(c) Should avoid felling trees and rather plant more trees

LESSON 8: TREATMENT OF WATER TO MAKE IT SAFE (Refer to Workbook Pages 33 - 37)

B4.2.1.5.1 Demonstrate ways of making water safe for use.

PART A

1. d
2. c
3. d
4. a
5. b

PART B

1.
   a. To trap all suspended particles= sedimentation
   b. To aid suspended particles to settle= addition of alum
   c. To kill microorganisms= addition of iodine tablets
2. There may have been microorganisms
3. (a)
   - Presence of microorganisms
   - When it smells
   - When it is coloured

   (b) (i) Calico=filtration.
   (ii) Alum=causes suspended particles to settle at the bottom
   (iii) Iodine tablets= kills germs.
   (iv) Heat source: kill germs
4. Look carefully at the mace below. It is about treatment of water for safe use.

X	Y	Z	H	O	**S**	L	P	L	C
K	U	X	N	L	**E**	**M**	L	P	D
M	D	U	P	D	**D**	**I**	O	K	O
N	L	Y	C	G	**I**	**C**	F	P	**F**
O	O	T	M	G	**M**	**R**	A	N	**I**
J	N	K	L	E	**E**	**O**	K	**O**	**L**
D	K	D	C	**R**	**N**	**O**	G	**D**	**T**
S	A	C	I	**I**	**T**	**R**	T	**O**	**R**
L	U	M	R	**V**	**A**	**G**	I	**U**	**A**
P	X	**A**	**P**	**E**	**T**	**A**	U	**R**	**T**
C	H	**L**	**O**	**R**	**I**	**N**	E	**L**	**I**
L	J	**U**	**N**	**A**	**O**	**I**	L	**E**	**O**
I	L	**M**	**D**	**I**	**N**	**S**	K	**S**	**N**
U	V	H	S	**N**	H	**M**	L	**S**	V

a. three sources of water: river, rain and pond
b. the purest form of the three sources of water identified= rain
c. one thing that can make water impure=microorganism
d. two things that can be used to treat water= Alum, chlorine
e. two processes that can be used to purify water= filtration, sedimentation

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

LESSON 9: FUNCTION OF THE PARTS OF PLANTS (Refer to Workbook Pages 38 - 42)

B4.2.2.1.1. Observe, identify and give functions of parts of plants.

PART A

1. b
2. b
3. c
4. c
5. c

PART B

1. Facilitator to use his or her discretion with respect to the diagram of favourite plant and label the parts by the learner.
2. (a) The leaf
   (b) It prepares food for the plant by using sunlight , water and carbon dioxide.
3. (a) The stem
   (b)
   - It holds the leaves
   - It transports water and mineral salt to the leaves
4. (a) The root, the stem and the leaves
   (b) Cassava= the root
   Sugar cane= the stem
   Onion= the leaves

LESSON 10: GERMINATION OF SEEDS (Refer to Workbook Pages 43 - 47)

B4.2.2.1.2: Examine some common seeds and how they germinate

PART A

1. c
2. c
3. a
4. c
5. a

PART B

1. Germination is the process through which a seed grows to become a baby plant called a seedling. Different plants require different number of days or hours before their seeds germinate. During germination, a baby plant emerges gradually from a viable seed. A viable seed is a seed that germinates into a seedling when all the necessary conditions are provided.
2.
   - Viability of the seed: if the maize seeds are not viable they will not germinate.
   - Presence of air: If the soil is not airy, they will not germinate well.
   - Presence of moisture or water: If there is no moisture in the soil they will not germinate.
   - Suitable temperature (not too low or too high to kill the seed): If the soil is too cold or too hot they will not germinate well
3. An experiment to show whether seeds need soil to germinate or not
   - Obtain four viable seeds, for example; bean seeds or maize seeds.
   - Soak cotton wool in water and place a viable seed on it and put in a test tube.
   - Make sure there is air available in the test tube.
   - Leave the experimental set up for 7 days.
   - Observe what happens. If the seed germinates, it shows that seeds do not need soil to germinate.
4. The oil on top of the water prevented the seeds from getting air. They will die and no longer be viable
5. The main stages in the germination of the seeds to become seedlings are
   - absorption of water by the seed coat to swell,
   - rapturing of the swollen seed coat,
   - sprouting of the root
   - sprouting of the stem and seed leaves
   - the elongation of the root and stem to become seedling

STRAND 3 : SYSTEMS
SUB-STRAND 1: THE HUMAN BODY SYSTEMS

LESSON 11: THE DIGESTIVE SYSTEM OF HUMANS (Refer to Workbook Pages 49 - 52)

B4.3.1.1.1 Know the organs of the digestive system and their functions

PART A

1. a
2. c
3. c
4. c
5. a

PART B

1. The part of the body that breaks down the food we eat is called the **digestive** system. The **digestive** system. The system consists of a number of **organs**. The food that enters the **mouth** passes through the various parts of the **digestive** system before the **unwanted** (undigested) part comes out of the body as **faeces**. The part through which the food passes as it moves down the various **organs** in the **digestive** system is called the **alimentary** canal.
2. (a) the mouth.
   (b) Food substances are digested to obtain end product which the body absorbs. Write the food substance from which the following end products are obtained
      i. Amino acid= protein(meat, egg, fish, beans, groundnut)
      ii. Glucose=carbohydrates(cassava, yam, rice).
      iii. Fatty acid and glycerol= fats and oil(palm oil, coconut oil).
   (c) faeces
3. (a) (i) saliva is it contains enzymes which mix with the food and help to breakdown food. The saliva also makes the food soft and easy to swallow.
   (ii) hydrochloric acid kills bacteria in the food
   (iii) The mucus protects the inner lining of the stomach wall.
   (b) Bile and enzymes

STRAND 3 : SYSTEMS
SUB-STRAND 1: THE SOLAR SYSTEMS

LESSON 12: THE SUN AS THE CENTRE OF THE SOLAR SYSTEMS (Refer to Workbook Pages 53 - 55)

PART A

1. c
2. d
3. d
4. c
5. b

PART B

1.
   i. Sun
   ii. Earth
   iii. Moon
   iv. Venus
2. Sun
3. A satellite is a **s**maller heavenly body that moves round a bigger body.
4. We do not see the stars in the afternoon because the sun's light is bright and the stars are very far away so their light is not seen.

STRAND 3 : SYSTEMS
SUB-STRAND 1: THE SOLAR SYSTEMS

LESSON 13: ECOSYSTEMS (Refer to Workbook Pages 56 - 60)

B4.3.3.1.1 Explain the concept of ecosystem

PART A

1. c
2. c
3. a
4. b
5. c

PART B

1. (a) An ecosystem is the community of plants and animals in a given place , together with the non-living parts of the environment e.g. air or water, is called
   (b) Water, air, light and soil.(any 3)
2. Look at the environment in which your school is located.
   a. Predict the type of ecosystem you think existed before the school was established= The answer depends on the location of the school in Ghana. It could be forest/ grassland.
   b. Write down three examples of living things and three non-living things which could exist in the ecosystem you predicted= The answer depends on the location of the school in Ghana. Living things could be mice, antelope, snakes, insects, birds, fish, frogs, lizard and others. None living things could be sand, stone, water, gravels and others .
   c. Three human activities which
      i. might have taken place in the past= farming, felling of trees, bush burning, sand winning, road construction (any 3 or any other 3 depending on the locality where the community is)
      ii. is still taking place now= farming, felling of trees, bush burning, sand winning, (any 3 or any other 3 depending on the locality where the community is)
3. (a)Write down two examples of ecosystem that can be found in the
   i. northern regions= grassland, pond
   ii. Ashanti region= forest, river, lake
   iii. Greater Accra Region= grassland, pond
   (b) Give two examples of living things in the ecosystem mention in 2(a)(i), (ii) and (iii)
   i. northern regions= guinea fowl, alligator, lizard, antelope(any 2 or any correct 2)
   ii. Ashanti region= tilapia, frog, squirrel, toad, lizard, cocoa tree, neem tree(any 2 or any correct 2 living things)
4. (a) Tree planting, application of organic manure to crops, avoiding bush burning
   (b) Write down two things that a goat can benefit from cassava plant
   A goat can get food from cassava plant. A goat can also get air(oxygen) from cassava plant.

STRAND 4: FORCES AND ENERGY
SUB-STRAND 1: SOURCES AND FORMS OF ENERGY.

LESSON 14: HOW HEAT CHANGES THE STATE OF SUBSTANCES (Refer to Workbook Pages 62 - 66)

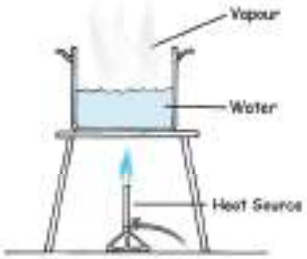
4.1.1.1 The effect of heat on the change of state of substances.

PART A

1. d
2. d
3. b
4. b
5. d

PART B

1. The three states of matter are
   i. Solid ii. Liquid iii. Gas
2.
   i. Bring the ice cubes from the freezer
   ii. Heat them with a source of heat
   iii. The ice cubes will be seen melting
3. The ice cubes will melt and become water.
4.



5.
   i. Put about 100cm3 of water into beaker
   ii. Place the beaker with water in a tripos stand with a source of heat
   iii. Wait for about 30minutes and observe what happens.
6. The heat will cause the water to become hot and after some time it will boil and produce vapour.
7. Condensation

STRAND 4: FORCES AND ENERGY
SUB-STRAND 1: SOURCES AND FORMS OF ENERGY.

LESSON 15: USES OF ELECTRICITY (Refer to Workbook Pages 67 - 71)

B4.4.2.1.1 Identify the uses of electricity

PART A

1. d
2. c
3. a
4. a
5. a

PART B

1.
   i. ironing of clothes
   ii. watching television
   iii. freezing water
   iv. keeping vegetables fresh in a refridgerator
2.
   i. bulb
   ii. connecting wires
   iii. Any of the following fruits: orange, lemon, potato, apple
3. To generate electricity from fruits.

LESSON 16: ELECTRICITY CONSERVATION (Refer to Workbook Pages 72 - 75)

B4.4.2.1.2 Describe ways of conserving electricity

PART A

1. b
2. b
3. b
4. b
5. d

PART B

1.
   i. Putting off light when not in use
   ii. Ironing clothes in bulk
   iii. Not watching TV and listening to radio at the same time
   iv. Switching off deep freezer when ironing clothes.
2.
   i. It can be expensive buying it.
   ii. Protect electric appliances from excessive heat.
3. True

LESSON 17: BASIC COMPONENTS OF ELECTRONIC CIRCUITS AND THEIR FUNCTIONS (Refer to Workbook Pages 76 - 79)

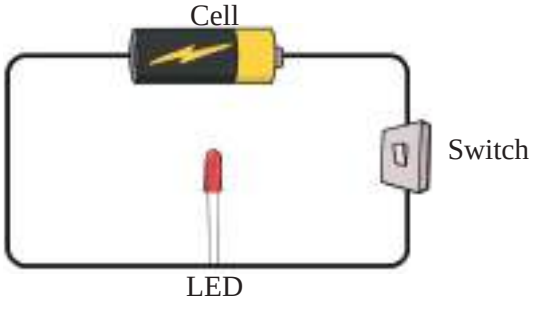
4.2.2.1 Identify the basic components of electronic circuit.

PART A

1. a
2. c
3. c
4. c
5. d

PART B

1.
   i. cell
   ii. connecting wire
   iii. switch
   iv. light emitting diode
2.



3.

Component		Use of component
Cells (battery)		Convert electric energy to light
Switch		Carry the electric charges round the circuit
Light emitting diode(LED)		Provide energy to drive the circuit
Connecting wires		Makes or breaks the circuit.

4. Conductors
5.
   i. Sodium chloride (common salt) solution
   ii. Hydrochloric acid
6. Light emitting diode

STRAND 4: FORCES AND ENERGY
SUB-STRAND 3: FORCES AND MOVEMENT

LESSON 18: ELASTIC AND COMPRESSIONAL FORCES (Refer to Workbook Pages 80 - 88)

B4 4.3.1.1: Demonstrate understanding of elastic and compressional forces and their everday applications

PART A

1. b
2. b
3. b
4. b
5. d

PART B

1. A force is a push or pull.
2.
   i. Causes a body to start moving
   ii. Causes a moving obdy to stop moving
   iii. Changes the direction of a moving body
   iv. Causes a body to accelerate or slow down.
3. Elastic force causes a body to extend but compression force causes a body to beome closer.

4.
   i. rubber band
   ii. stretchable spring

STRAND 5: HUMANS AND THE ENVIRONMENT
SUB-STRAND 1: PERSONAL HYGIENE AND SANITATION

LESSON 19: KEEPING OURSELVES AND THE ENVIRONMENT CLEAN (Refer to Workbook Pages 89 - 92)

B4.5.1.1.1 Know how to care for one's self and the environment.

PART A

1. b
2. c
3. b
4. d
5. c

PART B

1. In order to be healthy at all times, we must learn to bath twice every day. We must also clean our teeth with toothbrush twice a day and cut our fingernails regularly. Our personal belongings such as clothes and towels must be washed. We have to sweep our homes and classrooms every morning.
2. If you do not keep yourself and your environment clean, mention three diseases each that will affect
   i. your skin= Ringworm, rashes, eczema
   ii. your alimentary canal= cholera, typhoid, dysentery and diarrhoea(any3)
3. (a) Street children are always dirty.
   i. They do not
      - wash their hands with soap and rinsing them in clean water.
      - clean their teeth
      - bath regularly
      - keep our fingernails short and clean.
      - wash and take good care of our hair.
      - wash and dry their clothes.
   ii. Underline which of the following diseases they are likely to be infected with: ebola, malaria, cancer, cholera, dysentery, ulcer, skin rashes, goiter.

   (b)
      - Washing our hands with soap and rinsing them in clean water.

- Cleaning our teeth
- Bathing
- Keeping our fingernails short and clean.
- Washing and taking good care of our hair.
- Washing and drying our clothes.

(any3)

LESSON 20: WASTE MANAGEMENT (Refer to Workbook Pages 93 - 96)

B4.5.1.1.2 Describe ways of sustaining the environment through waste management

PART A

1. d
2. b
3. a
4. d
5. c

PART B

1. Use a tick in the box to select which of the following are ways of Managing Waste in our environment
   i. We must sustain the environment by throwing rubbish in gutters only.[ ]
   ii. We must sweep our living places (house, school) regularly. [√]
   iii. We must clean the gutters around our houses regularly. [√]
   iv. We also have to avoid putting waste items such as mineral water sachets and bottles on the floor. [√]
   v. When dust bins get full, we have to empty them in the big gutters [ ]
2. (i)
   - Separate solid waste from the liquid waste by filtration
   - Pour the liquid waste into the sink.
   - Put the solid waste into the dustbin and cover it
   - Empty the solid waste into a refuse damp

   (ii) Write down the wrong step or steps people in your community take to manage this waste.
   - Pouring the liquid waste into the gutter or in the neighbourhood.
   - Putting the solid waste into the dustbin and fail to cover it
   - Emptying the solid waste into a gutter or a anywhere when nobody is watching them
   - Allow heaps of refuse in the community for a long time
3. (a)Write down three sources of waste in your toilet

i. Used tissue
ii. water on the floor
iii. faeces

(b) State how you will manage the waste identified in (a) in your toilet

i. Used tissue= Collect it, put it in a dustbin, cover it and later dispose of it in a refuse dump.
ii. Water on the floor= mop it
iii. Faeces= clean it with water, a brush and soap

STRAND 5: HUMANS AND THE ENVIRONMENT
SUB-STRAND 2: DISEASES

LESSON 21: MEASLES (Refer to Workbook Pages 93 - 96)

B4.5.2.1.1 Identify causes, symptoms and prevention of measles

PART A

1. b
2. b
3. c
4. b
5. c

PART B

1.
   i. Measles is caused by heat. True[ ] False[√]
   ii. There are no symptoms associated with measles True[ ] False[√]
   iii. Measles is spread in the same way as cholera True[ ] False[√]
   iv. You can prevent measles by vaccination True[√] False[ ]
2.
   i. Using skin disease ointment
   ii. Vaccination
   iii. Isolate infected person
   iv. Making contact with infected person
   v. Clothing should be clean and changed once a month.
3. The following sentences about measles are all not correct. Identify the wrong sentences by underlining the incorrect words. Replace these words and rewrite the correct sentences below

in the space provided:
*The **bacteria** that cause measles can be transferred from one person to another through **food**. When the **bacteria** fall on humans whose immune system is **strong**, they begin to grow. **Boils** appear on the neck and behind the ears and later spread all over the body. This **boil** is itchy and as it bursts because of scratching, it spreads to other parts of the body. If not detected early and treated, measles can **make you mad**.*

*The **virus** that cause measles can be transferred from one person to another through **air**. When the **spores** fall on humans whose immune system is **weak**, they begin to grow. **Rashes** appear on the neck and behind the ears and later spread all over the body. This **rashes** is itchy and as it bursts because of scratching, it spreads to other parts of the body. If not detected early and treated, measles can be **fatal**.*

4. She may have come into physical contact with an infected person

LESSON 22: SOME COMMON FOOD-BORNE DISEASES (Refer to Workbook Pages 97 - 100)

B4.5.2.1.2. Demonstrate understanding of the causes, symptoms and prevention of food-borne diseases.

PART A

1. a
2. a
3. b
4. b
5. c

PART B

1. Complete the following sentences with the correct word: Typhoid is caused by a bacterium called Salmonella typhi. It can be contracted from food or water that is contaminated by faeces of an infected person just like cholera.
2. (a) mild fever(body pains).
   (b)
   - abdominal pains with constipation(inability to have free bowels)
   - diarrhea
3. (a)
   - eating hot food
   - covering food
   - vaccination
   - washing hands with soap before eating
   - safe disposal of sewage

- purification of water supplies (any 4)

(b) The germs in the gutter or rubbish may be carried by houseflies when they settle on the food which not covered

STRAND 5: HUMANS AND THE ENVIRONMENT
SUB-STRAND 3: CLIMATE CHANGE

LESSON 23: THE DANGERS POSED BY BURNING TO THE ENVIRONMENT (Refer to Workbook Pages 101 - 104)

B4.5.4.1.1 Explain that burning is one of the causes of climate change

PART A

1. c
2. d
3. d
4. d
5. d

PART B

1.
   i. Makes air dirty
   ii. Causes heat to increase temperature
   iii. Kills organisms that are living
   iv. Increases carbon dioxide levels
2. Can kill living things
3. green house effects
4.
   i. Smoky vehicles
   ii. Bush fires
   iii. Hunting using five traps
   iv. Farmers burning cut down bushes for farming
5. Kerosene