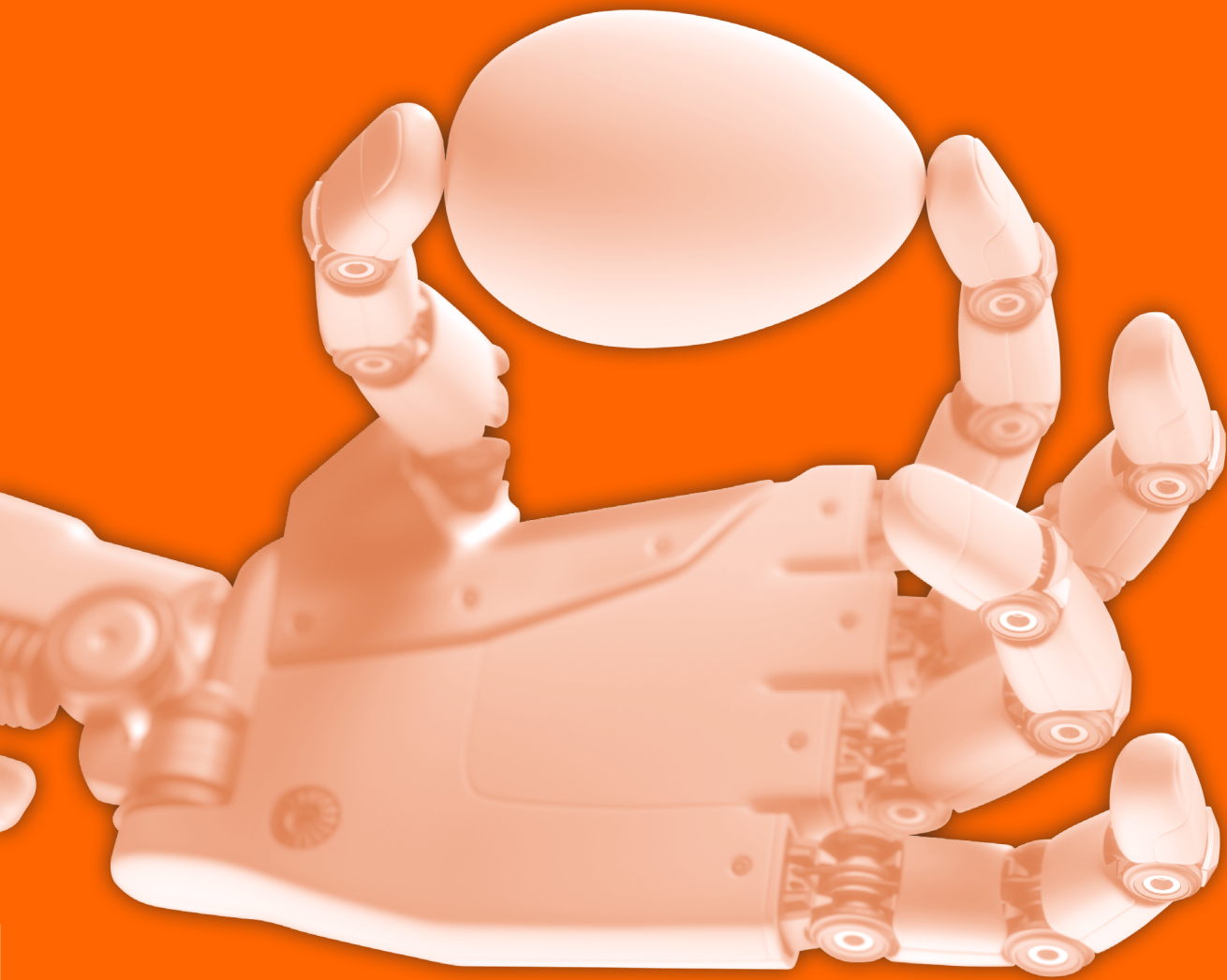


ESSENTIAL Science

Primary 6

Teacher's Guide



CAMBRIDGE



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Teacher's Guide

John Wilberforce Essiah



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Structure of the Teacher's Guide

The concise Teacher's Guide is organized under the following headings and features.

Sub-strand

NaCCA, Ministry of Education 2019 curriculum Sub-strand covered.

Strand

The relevant NaCCA, Ministry of Education 2019 curriculum Strand covered is in the top bar.

Page reference

You will find the Learner's Book and Workbook page references on the top right/left for each lesson.



LESSON 1: The root system of plants

CONTENT STANDARDS:

B6.1.1.1 Show an understanding of the physical features and life processes of living things and use this understanding to classify them.

INDICATOR:

B6.1.1.1.1 Classify plants based on their root system.

LEARNERS EXPECTATIONS

Learners will:

- Identify the main types of root systems in plants.
- Distinguish between the fibrous and taproot systems.
- Identify common plants that have fibrous and tap root systems.

NEW WORDS

Roots, taproot, fibrous root.

RESOURCES

Pictures of plants with different roots.

CORE COMPETENCIES

Critical thinking and Problem-Solving
Communication and Collaboration
Creativity and Innovation

SUBJECT SPECIFIC PRACTICES

Observing, Communicating, Planning
Analysing, Designing, Interpreting

HELPFUL LINKS

- <https://classnotes.org.in/class-6/science/getting-to-know-plants/root-stem-and-leaf/>
- <https://youtu.be/AhcHhZ5r2Ok>

Background information

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

The roots are the part of the plant that support it to be able to stand firmly in the soil. Plants also absorb water and nutrients from the soil through their roots.

Different plants have different roots. We are able to classify plants based on the roots they have. Plant roots are classified into fibrous and tap root systems.

Starter

Ask learners to uproot some plants around the school compound and name the parts.

Drill learners on the correct pronunciation and meanings of the new words.

Teaching instructions

Activity 1

Differences between tap and fibrous root systems

- Put learners into groups of five. Task them to work under the assistance of a leader to uproot different young plants around the school. (Carefully uproot the plants so that the roots do not get damaged).
- Ask each group to observe the roots of the different plants they have gathered.

Activity 2

- The group members should work together to classify each root as fibrous or tap root.
- Each of them should identify any differences between the tap and fibrous root systems.
- Let them share their findings with the rest of the class.

Talk about

Refer learners to the 'Talk about' questions for discussion on page 10 of the Learner's Book.

"Why are grasses grown on bare lands in front of buildings?"

Teaching instructions

You will find all activities you are expected to perform under each lesson here. References are made to the Learner's Book where necessary.

New words

Every lesson in the series identifies key words that learners are expected to know and use appropriately. These are relevant to the lesson.

Resources

Helps to aid preparation. The series identifies all the relevant resources necessary to deliver a successful lesson. Resources identified are mostly "NO COST" or "LOW COST" materials that teachers/facilitators can easily acquire to make their lessons more meaningful and enjoyable.

Helpful links

Comprehensive site of helpful links for educational or teaching tips and ideas are provided under some lessons. These are internet links to text, pictures and videos that you will use during the lessons. Download them ahead of the lesson.

Background information

Refers to the details that identify and describe the significance and historical value of the lesson topic. It is a vital element, as it provides relevant, factual details that are related to a specific topic.

Indicator

This feature indicates the specific things that learners need to know and be able to demonstrate in order to achieve the content standards. Lessons are generated from these indicators.

Content standards

This feature indicates the broad expectations under the strands that learners are expected to achieve in the course of completing that grade level.

Learning Expectations

are provided to help both teachers/facilitators and learners identify what learners are required to know, understand and do in order to achieve the learning indicator(s).

Core competencies

The universal core competencies as stated under each sub-strand in the curriculum is outlined here.

Subject specific practices

This is the specific methods or practices which are used to teach a particular lesson under the sub-strand.

Strand I: DIVERSITY OF MATTER**Sub-strand I: LIVING AND NON-LIVING THINGS****LESSON 1: The root system of plants**

LB: pages 6 - 10 ; WB: pages 6 - 7

CONTENT STANDARDS:

B6.1.1.1 Show an understanding of the physical features and life processes of living things and use this understanding to classify them.

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Starter

Ask learners to uproot some plants around the school compound and name the parts.

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Teaching instructions**Activity 1****Differences between tap and fibrous root systems**

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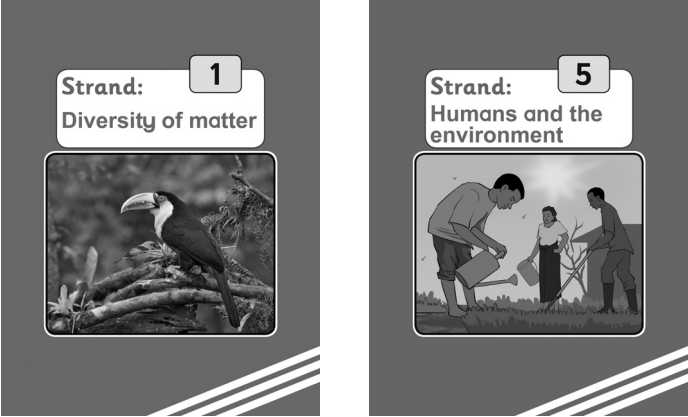
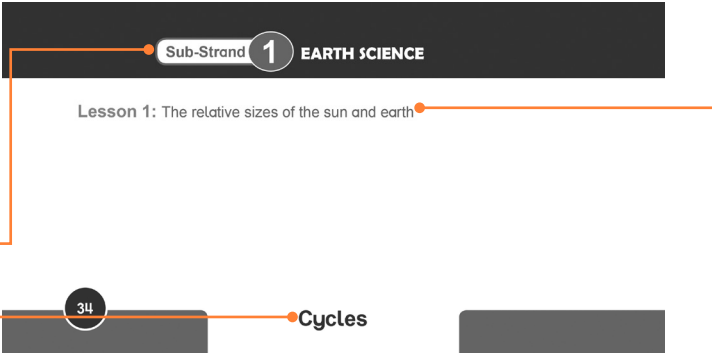
Starter

Starters help in preparing learners for new skills, methods or concepts, reinforcing previous steps necessary for this new learning/ lesson.

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Organisation and structure of the Learner's Book

The user-friendly Learner's Book tackles the new standard-based Science curriculum features and criteria with a clear and logical structure that incorporates the following features.

Strand Opener There are five “strands” in the Learner's Book – one for each of the Science curriculum. This precedes the beginning of contents under each strand.	
Header and footer labels Strand: This feature indicates the particular strand from which the lessons are developed. Sub-strand: These are larger groups of related science topics to be studied under each strand. Lesson: This feature specifies the lesson number under a sub-strand. The lessons are derived from the indicators.	
New words build subject-specific vocabulary gradually, giving learners the confidence to understand it clearly and apply it in context and through different exercises.	New words metals lustre malleability conductivity
ICT boxes - include research activities - emphasise the core competencies.	ICT Go on the internet and watch videos on conditions required for plants to grow. https://youtu.be/TE6xptjgNR0
Talk about Learners are expected to discuss questions either in groups or in pairs. It is a critical thinking section that also helps their communication and collaborative skills.	Talk about Iron is used for building homes, but it is not good for making jewellery. Explain why?

Project for home or school

- It helps consolidate what learners have already learnt in class. You are expected to direct learners on what they are to do either at home or in school.

Project for home or School

Find out the different ways that metals are used in your homes. Identify the property of metals that allow it to be used for that purpose at your home.

Project: Design toy cars, graters, dust pans, knives, shovels and spoons using metallic objects such as milo, sardine, turpentine and milk tins.

What I have learnt

- helps summarise what have been learnt under each lesson
- through questioning the facilitator assesses what the learners have learnt.

WHAT I HAVE LEARNT

- Metals are very useful to humans.
- We use metals to produce goods such as cars, roofing sheets, coins, wires, and jewellery.
- The uses of metals are based on their properties such as hardness, malleability, lustre and conductivity.

Review Exercise

- Learners practice and consolidate what they have been taught. This provides an opportunity for all learners to strengthen their newly acquired knowledge.

Review Exercise

Exercise 1

- What is water conservation?
- Write 3 things you can do to conserve water at home and school.
- Fill in the blank spaces with the correct words.
(wasting, bathing, wisely, conserve, resource)

Water is a very important We use it for daily activities such as We need to avoid It. We can it by using less water for daily activities. In that way we are using it

- Indicate whether each of the following are **correct** or **wrong** ways of using water.
 - Turn off the tap while brushing your teeth
 - Turn off the tap while washing your hands.
 - Use a bucket to clean the floors.
 - Use water hose to wash a car.
 - Water your lawn four times a day.

Activities

- incorporate accurate and current individual, pair and group work activities that help learners to explore and practise what they have learnt
- incorporate exercises that allow learners to answer questions about what they have learnt and consolidate learning
- address the syllabus content standards and core competencies
- are representative of the indicators and exemplars
- have instructions and text that are consistent and clearly presented to learners
- promote problem solving and subject understanding.

Activity 1

Designing Posters on Water Conservation

Materials Required: Cardboard or Paper, Poster colours, pencils

- Work in pairs on this activity.
- With the help of your teacher, write down simple messages on water conservation on the card board or A4 sheet.
- You can write messages such as "Water is Life", "Use Water Wisely", "Avoid Wasting Water".
- colour your posters beautifully and fix them on the classroom wall.

Text and content

- use language that is appropriate to the level, age, knowledge and background of the learners
- are representative of Ghana's diversity
- have a good gender balance and portray no gender stereotypes.

Illustrations and photos

- are high-quality and representative of Ghana's diversity
- balance the text on every page and add to learners' understanding of the content
- have captions and labels that are simple, relevant, appropriate, and clear
- reflect a variety of learners (including learners with special needs)
- show no gender stereotypes.

Sub-Strand 1 EARTH SCIENCE

Ways of conserving water
In order to avoid wasting water, we must observe the rules below:

- Turn off the tap while brushing your teeth.
- Turn off the tap after washing your hands.
- Flush with less water.
- Don't run the dishwasher or washing machine until it's full.
- Shower with less water.
- Use a bucket to clean the floors.
- Use a bucket and sponge to clean the car.
- Use a watering can to water the plants.
- Water your lawn only when you need to.
- Check your toilet for leaks.
- Capture and harvest rainwater for use.

Using a bucket of water to clean floor

Using bucket and sponge to clean the car

Capturing rain water with basins

Watering plants with a watering can

Sub-Strand 2 MATERIALS

Aluminum roofing sheets

Coloured roofing sheets

Coin

Necklace

Watch

Ring

Bronze statue

Jewellery is made of metals which are lustrous. We adorn ourselves with rings, watches, necklaces and ear rings made of metals. Metals for making jewellery include gold, silver and copper. Shiny metals are also used for making statues and coins.

Strong and hard metals such as iron are used in constructing homes and factories. Iron is also used for making parts of ships and vehicles such as cars, trains, and trucks.

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Cycles

Diversity of matter

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INTRODUCTION

Science is such a broad topic that it is broken down into disciplines or branches based on the particular area of study. Learn about the different branches of science from these introductions. Then, get more detailed information about each science.

The objective of this Teacher's Guide is to make teaching and learning more interactive, practical, useful and to bring out the ingenuity of teacher professionalism in the teacher/facilitator to produce well-equipped learners for national development.

This Teacher's Guide has been carefully designed to help teachers/facilitators teach effectively using the Learner's Book and its accompanying Workbook.

The Teacher's Guide helps teachers/facilitators to prepare adequately for each lesson by suggesting the following:

- Expected outcomes of the lesson
- The subject specific practices and core competencies to be developed in the lesson
- The pedagogical approaches to be used for the lesson
- The resources to be used in teaching the lesson
- The main points of the lesson
- Ideas or tasks that stimulate critical thinking among learners.

It is expected that after carefully studying the Teachers' Guide, teachers/facilitators will be able to:

1. Know the provisions in the Learner's Book in terms of Aims, Values, Core Competences and School Time Allocations.
2. Know the recommended teaching and assessment approaches for each lesson.
3. Understand the structure and scope of sequence of the science curriculum.
4. Prepare schemes of learning for a given academic year, term or week.
5. Select and design appropriate assessment tasks for a given lesson.

Ultimately, the Teacher's Guide will contribute tremendously in ensuring the smooth implementation of the new standards-based science curriculum for primary Schools.

Role of the Teacher/Facilitator in the effective use of the Learner's Book

The Curriculum encourages the creation of a learning-centred classroom with the opportunity for learners to engage in meaningful "hands-on" activities that bring home to the learner what they are learning in school and what they know from outside of school.

The teacher as a facilitator needs to create a learning environment that supports:

- The creation of learning-centred classrooms through the use of creative approaches to teaching and learning as strategies to ensuring learner empowerment and independent learning.
- The positioning of inclusion and equity at the centre of quality teaching and learning.
- The use of differentiation and scaffolding as teaching and learning strategies for ensuring that no learner is left behind.
- The use of Information and Communications Technology (ICT) as a pedagogical tool.
- The identification of subject specific instructional expectations needed for making learning in the subject relevant to learners.
- The integration of assessment for learning, as learning and of learning into the teaching and learning process and as an accountability strategy.
- Using questioning techniques that promote deeper learning.

Rationale for Primary Science

Science forms an integral part of our everyday activities and it is a universal truth that development is hinged on Science. Science and technology is the backbone of social, economic, political, and physical development of a country. It is a never-ending creative process, which serves to promote discovery and understanding. It consists of a body of knowledge which attempts to explain and interpret phenomena and experiences. Science has changed our lives and it is vital to Ghana's future development. To provide quality Science education, teachers/

facilitators must facilitate learning in the Science classroom. This will provide the foundations for discovering and understanding the world around us and lay the grounds for Science and Science-related studies 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 causes and origins of things in our environment. The Science curriculum has considered the desired outcomes of education for learners at the basic level. 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 therefore ought to be taught using hands-on and minds-on approaches which learners will find as fun and adopt Science as a culture.

Philosophy

Teaching philosophy

Ghana believes that an effective Science education which is 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 teaching and learning approaches that engage learners physically and cognitively in the knowledge-acquiring process, in a rich and rigorous inquiry-driven environment.

Learning philosophy

Science Learning is an active contextualized process of constructing knowledge based on learners' experiences rather than acquiring it. Learners are information constructors who operate as researchers. Teachers/facilitators serve as facilitators by providing the enabling environment that promotes the construction 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 Guidelines

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 arrangements to provide feedback to both learners and parents.
5. Design and manage learning environments that provide students with the time, space, and resources needed for learning Science.

Class management

Most teachers/facilitators in Ghana teach large classes. Such classes are in the range of 40 to 100 learners or more. The teachers/facilitators based on their professional experience over the years have developed skills in classroom methodology. Here are a few reminders about whole class, group, pair and individual work that could be helpful with large classes.

Whole class teaching

Much of your teaching, especially when your class is large, will involve you standing at the front of the class explaining and listening to your learners. You can set out facts and concepts which everyone can understand. However, your class will vary in ability. More able learners should be given additional tasks to stretch their capabilities while those who find understanding more difficult should be given the time and attention they need.

When you introduce a topic make sure you use learners' existing knowledge and build upon it. The basic information for your lesson is in the text. If you are going to ask learners to read for themselves (at home or in class or to read out loud), work out during your lesson planning which words will be difficult for them to understand and explain these first. Make sure that all your learners have understood your explanation and give time to those having difficulty as well as by talking and listening you

will find other activities can be very valuable during whole-class teaching, for example:

Group work

Class teaching is large group work but sometimes there are advantages in working in pairs or groups of four to six learners: some children make more progress when working in a group of the same ability. On other occasions more able learners can help those who are not quite so quick at understanding. Groups of friends and groups working on different topics are other possible divisions that you could make.

For group work to be successful some thought must be given to the organization of class furniture. In most of our classrooms we still see rows of desks with several children to each desk. The classrooms are also often crowded so that it is not easy to move the desks around. Whatever the situation, some kind of group can be organized. At its most basic, the group will have to be learners at one desk. It might be possible for those at one desk to turn around to face those at the desk behind.

There are many advantages in allowing a number of children to consider a topic, work jointly and bring their findings back to the whole class: each group will think in a slightly different way and have different experiences to share. Sometimes learners are better able to discuss sensitive areas in same-sex groups. Such work encourages co-operation and mutual support. Individual groups can study a picture together, or write a poem or discuss a topic like pollution in their village. You need to ensure that there is follow-up to group work so that work is not done in isolation but is instead considered by the class as a whole.

Pair work

Learners are often instructed to work in pairs – either with their desk mate, or with a partner. This is an ideal opportunity for learners to assist each other, and for them to assess each other. Working with a desk mate offers the least classroom disturbance. The learners are already seated side-by-side. They ask and answer questions during Picture talk, and they discuss the readings before they write comprehension answers individually.

Working with a partner that you have allocated to the learner means that you can pair a slower learner with a faster learner, so that they can help one another. You may also choose to pair learners of similar abilities together, so that they can proceed more quickly with the work, while you assist the slower pairs.

Learner self-study

There will be times when you want the class to work as individuals to allow them to become familiar with material you have given them and to allow you to work with Learners of different abilities. It is worth bearing in mind that while there is a need for learners to learn how to read and study on their own, there are also dangers in this approach. It is essential that the material they read is understandable to them, and that your attention is still focused on the class to ensure that all learners are using the time to read and not misbehave. Use additional material at different levels to ensure that some learners do not finish more quickly than others.

Teaching tip

One of the most important skills in classroom management is the ability to ensure your learners are occupied for the whole lesson. If a group has finished its task and has nothing else to do it is likely to become disruptive. Break up your lesson and make sure it has several different parts:

- full class work
- individual work
- practical activities

Pedagogy and Assessment

Creative and learning-centred pedagogies for Science

1. *Activity-based learning, hands-on, creative, participatory method of learning.*

- Science teachers/facilitators should devise activities to suit the age group and skills of the learners.
- There should be variety in activities. Sorting of items into groups, creation of posters, hands-on activities. separating samples of given mixtures.
- Activities should not only help gather knowledge, but apply and evaluate knowledge, e.g. designing and building objects from common materials.

2. **Demonstrations**

- The teacher/facilitator retains the formal authority role by showing learners what they need to know, e.g. demonstrating how to construct an electronic circuit.

3. **Inquiry-based learning**

- Teachers/facilitators design an investigation toward answering questions, e.g. How is soap produced within the local community?
- Learners carry out an investigation – gather data (by asking their parents, people in the community).
- Develops information processing and problem-solving skills, e.g. learning about the steps/processes involved in soap making).
- Makes use of resources beyond classroom/school, e.g. visiting local production sites.

4. **Group work (think-pair-share, collaborative learning, problem-based learning, team-based learning/discussions)**

- Collaborative learning highlights the contributions of individual group members, and leads to dialogue and consensus building on topics without a clear right and wrong answer, e.g. placing learners into groups to discuss the physical features that enables various organisms to live in the sea, land or air.

5. **Project-based learning**

- Project-based learning is a teaching method in which learners gain knowledge and skills by working for an extended period of time, e.g. reading and recording the school/home's electricity consumption over a month.
- This focuses on investigating and responding to an authentic, engaging and complex question, problem, or challenge, e.g. how to solve the problem of poor sanitary conditions in the school.

Other approaches for teaching Science learning

- ICT-based learning
- Engaging learners in meaningful learning
- Organisation of field trips and nature walks
- Use of concept maps, mind maps and

future's wheel Invitation of professionals to make class presentations

- Changing the learning setting
- Implementation of a reward system
- Use of educational games, songs and ice-breakers.

Use of ICT

The use of ICT is firmly incorporated in the Learner's Book During science lessons, learners need to be exposed to the various ICT tools around them.

Some schools in urban areas have access to computers in school or in libraries. Rural areas will become linked in the future. You should learn how to use a computer as soon as you are able to do so. They open up the world as your resource. The internet can provide as much additional material as you will ever need. Once your learners have the chance to use a computer they too will have access to a world of information. This can be done through effective use of the following ICT tools:

- Laptop or desktop computers
- Smartphones
- Tablets
- CD players
- Projectors
- Calculators
- Radios
- Cameras
- Television sets
- Computer and related software, such as Microsoft Office packages (Word, PowerPoint and Excel).

ICTs are a useful communication technology that can by and large be used to enhance the quality of teaching and learning in schools. Internet systems have made the world a globalized one. It is for this that Professor Ali Mazrui describes globalization as "the villagization of the world" hence, the world being a "global village" (Marshall McLuhan and Quentin Fiore, 1968). This means all parts of the world are being brought together by the internet and other electronic communication interconnections. That is, more information has become accessible anywhere in the world by way of interconnectedness and interdependency. You can communicate to anybody anywhere in the world from the comfort of your room, car and many more places. In

working towards the rationale of the Science curriculum, there is the urgent need for the teacher/facilitator to display professionalism through effective use of ICTs in teaching and learning.

The teacher/facilitator should try as much as possible to use whatever technological resources available such as any of those stated above to assist in teaching and learning. The use of ICTs in teaching and learning activities promotes a paradigm shift to a learner-centered environment. Here are some useful ideas on how to go about this:

Integrate ICT's in the learning process, as a key competence and contribute to the acquisition of skills and knowledge.

- Use ICT's in the classroom to work on information processing, authentic communication, and on the learner autonomy, as the builder of his or her own learning process.
- Give ICT's a role to help young people be able to arrange, evaluate, synthesize, analyze and decide on the information that comes to them.
- Challenge learners with different types of supports and formats and, therefore, a great variety of activities in which they pass from receivers to makers.
- Attend to the diversity or learning needs of students, using the copious offer of interactive exercises available on the web.

Assessment

Assessment is a process of collecting and evaluating information about learners and using the information to make decisions to improve their learning.

In this curriculum, it is suggested that assessment is used to promote learning. Its purpose is to identify the strengths and weaknesses of learners to enable teachers/facilitators to ascertain their learners' response to instruction. Assessment is both formative and summative. Formative assessment is viewed in terms of Assessment **as** learning and Assessment **for** learning.

Assessment as learning: Assessment as learning relates to engaging learners to reflect on the expectations of their learning. Information that learners provide the teacher/facilitator forms the basis for refining teaching-learning strategies. Learners are assisted to play their roles and to take responsibility for their own learning to improve performance. Learners are assisted to set their own goals and monitor their progress.

Assessment for learning: It is an approach used to monitor learners' progress and achievement. This occurs throughout the learning process. The teacher/facilitators 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 and what they know and can do over a period of time. The emphasis is to evaluate the learners' cumulative progress and achievement.

It must be emphasized that all forms of assessment should be based on the domains of learning. In developing assessment procedures, 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 learners. When you develop assessment items or questions that are based on a representative sample of the indicators taught, the assessment is referred to as a "Criterion-referenced Assessment". In many cases, a teacher/facilitator cannot assess all the indicators taught in a term or year. The assessment procedure you use, i.e. class assessments, 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.

Designing assessment tasks in the New Curriculum

- Puzzles, Fill-ins, Riddles, maze, scrambled words, true or false, Drawing, Spot the difference, Matching, Pick the odd one out, Objectives with options, rearrange, Gallery Walks,

Below is a sample rubric which you can use to assess your learners' performance in science. This can be adapted and used for any assessment tool (exam, activity, PowerPoint)

SAMPLE RUBRIC FOR ASSESSING LEARNERS PERFORMANCE

Rubric -Primary School Science	LEVEL 1 With strong prompting from the teacher/ facilitator	LEVEL 2 With some prompting from the teacher/ facilitator	LEVEL 3 With minimal prompting from the teacher/ facilitator	LEVEL 4 Without prompting from the teacher/ facilitator
OBSERVATION	Learners use one of their senses to observe basic information	Learners use at least one of their senses to observe basic information	Learners notice detailed characteristics and phenomena	Learners extend/ apply their observations to related objects and/or events
INVESTIGATION	Learners participate minimally in carrying out the experiment	Learners participate in carrying out the experiment	learners participate in carrying out the experiment and asks "how", "what", and/or "why"	Learners expresse strong sense of wondering and carry out additional experiments
REASONING	Learners draw basic conclusions	Learners draw detailed conclusions	Learners draw connections between ideas and evaluates the choices	LearnerS ask "what if" and make hypotheses about related objects and/or events
COMMUNICATION	Learners struggle to express what they did	Learners present conclusions partially supported by data	Learners effectively use data to express their conclusions, and use materials/ role play/other methods of communication to present them	Learners use data to clearly articulate their observations, approach and findings with detail, and they use creative methods to present them
UNDERSTANDING	Learners present minimal understanding of the relevant concepts	Learners present weak connectionS between observation and concept	Learners present evidence of understanding of relevant concepts, theories or principles	Learners present evidence of in-depth understanding of relevant concepts, theories or principles

Source: NaCCA, Ministry of Education 2019

Core competencies

The core competencies describe a body of skills that teachers/facilitators at all levels should seek to develop in their learners. They are ways in which teachers/facilitators 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 processes of teaching and learning.

Critical Thinking and Problem Solving (CP)

This skill develops learners' cognitive and reasoning abilities to enable them to analyse and solve problems. Critical thinking and problem-solving skill enable learners to draw on their own experiences to analyse situations and choose the most appropriate out of a number of possible solutions. It requires that learners embrace the problem at hand, persevere and take responsibility for their own learning.

Creativity and Innovation (CI)

Creativity and Innovation promotes the development of entrepreneurial 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 skill are also able to think independently and creatively.

Communication and Collaboration (CC)

This competence promotes in learners the skills to make use of languages, 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 (CG)

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, competences and attitudes acquired to contribute effectively towards the socio-economic development of the country and on 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 (PL)

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. PL helps them acquire the skill of leadership, self-regulation and responsibility necessary for lifelong learning.

Digital Literacy (DL)

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

Learning domains (expected learning behaviours)

A central aspect of this curriculum is the concept of three integral learning domains that should be the basis for instruction and assessment. These are:

- Knowledge, Understanding and Application
- Process Skills
- Attitudes and Values

Teachers/facilitators must ensure that daily learning covers all these three important domains through the use of relevant resources, and utilization of appropriate teaching pedagogies and assessment tasks.

KNOWLEDGE, UNDERSTANDING AND APPLICATION

Under this domain, learners acquire knowledge through some learning experiences. They may also show understanding of concepts by comparing, summarising, rewriting etc. in their own words and constructing meaning from instruction. The learner may also apply the knowledge acquired in some new contexts. At a higher level of learning behaviour, the learner

may be required to analyse an issue or a problem.

SKILLS AND PROCESSES

These are specific activities or tasks that indicate performance or proficiency in the learning of Science. They are useful benchmarks for planning lessons, developing exemplars and are the core of inquiry-based learning.

Equipment and apparatus handling

This is the skill of knowing the functions and limitations of various apparatus, and developing the ability to select and handle them appropriately for various tasks.

Observing

This is the skill of using the senses to gather information about objects or events. This also includes the use of instruments to extend the range of our senses.

Classifying

This is the skill of grouping objects or events based on common characteristics.

Comparing

This is the skill of identifying the similarities and differences between two or more objects, concepts or processes.

Communicating/Reporting

This is the skill of transmitting, receiving and presenting information in concise, clear and accurate forms - verbal, written, pictorial, tabular or graphical.

Predicting

This is the skill of assessing the likelihood of an outcome based on prior knowledge of how things usually turn out.

Analysing

This is the skill of identifying the parts of objects, information or processes, and the patterns and relationships between these parts.

Generating possibilities

This is the skill of exploring all the options, possibilities and alternatives beyond the obvious or preferred one.

Evaluating

This is the skill of assessing the reasonableness, accuracy and quality of information, processes or ideas. This is also the skill of assessing the quality and feasibility of objects.

Designing

This is the skill of visualizing and drawing new objects or gadgets from imagination.

Measuring

This is the skill of using measuring instruments and equipment for measuring, reading and making observations.

Interpreting

This is the skill of evaluating data in terms of its worth: good, bad, reliable, unreliable; making inferences and predictions from written or graphical data; extrapolating and deriving conclusions. Interpretation is also referred to as "Information Handling".

Recording

This is the skill of drawing or making graphical representation boldly and clearly, well labelled and pertinent to the issue at hand.

Generalising

This is the skill of being able to use the conclusions arrived at in an experiment to what could happen in similar situations.

Designing of experiments

This is the skill of developing hypotheses; planning and designing of experiments; persistence in the execution of experimental activities; modification of experimental activities where necessary in order to reach conclusions.

Values

At the heart of this curriculum is the belief in nurturing honest, creative and responsible citizens. As such, every part of this curriculum, including the related pedagogy, should be consistent with the following set of values:

Respect: This includes respect for the nation of Ghana, its institutions and laws and the culture and respect among its citizens and friends of Ghana.

Diversity: Ghana is a multicultural society in which every citizen enjoys fundamental rights

and responsibilities. Learners must be taught to respect the views of all persons and to see national diversity as a powerful force for national development. The curriculum promotes social cohesion.

Equity: Socio-economic development across the country is uneven. Consequently, it is necessary to ensure an equitable distribution of resources based on the unique needs of learners and schools. Ghana's learners are from diverse backgrounds, and thus require the provision of equal opportunities to all, and that, all strive to care for each other.

Commitment to achieving excellence: Learners must be taught to appreciate the opportunities provided through the curriculum and persist in doing their best in their fields of endeavour as global citizens. The curriculum encourages innovativeness through creative and critical thinking and the use of contemporary technology.

Teamwork/Collaboration: Learners are encouraged to become committed to team-oriented working and learning environments. This also means that learners should have an attitude of tolerance to be able to live peacefully with all persons.

Truth and integrity: The curriculum aims to develop learners into individuals who will consistently tell the truth irrespective of the consequences, and be morally upright with an attitude of doing the right thing even when no one is watching. Learners are also taught to, be true to themselves and be willing to live the values of honesty and compassion. Equally important, is the practice of positive values as part of the ethos or culture of the work place, which includes integrity and perseverance. These underpin the competencies learning processes to allow learners to apply skills and competencies in the world of work.

Time allocation

A total of four periods a week, each period consisting of thirty minutes, is allocated to the teaching of Science at the lower basic level (B4–B6). It is recommended that the teaching periods be divided as follows:

Theory: 2 periods per week (30 minutes per period)

Practical: 2 periods per week (one double-period)

Inclusion

Inclusion entails access and learning for all learners, especially, those disadvantaged. All learners are entitled to a broad and balanced curriculum in every school in Ghana. The daily learning activities to which learners are exposed should ensure that the learners' right to equal access to quality education is being met. The curriculum suggests a variety of approaches that address learners' diversity and their special needs in the learning process. These approaches when used in lessons, will contribute to the full development of the learning potential of every learner. Learners have individual needs and different learning styles, learning experiences and different levels of motivation for learning. Planning, delivery and reflection on daily learning episodes should take these differences into consideration. The curriculum therefore promotes:

- learning that is linked to the learners' background and to their prior experiences, interests, potential and capacities;
- learning that is meaningful because it aligns with learners' ability (e.g. learning that is oriented towards developing general capabilities and solving the practical problems of everyday life); and
- the active involvement of the learners in the selection and organisation of learning experiences, making them aware of their importance in the process and also enabling them to assess their own learning outcomes.

Differentiations and scaffolding

This curriculum is to be delivered through the use of creative approaches. Differentiation and Scaffolding are pedagogical approaches to be used within the context of the creative approaches.

Differentiation is a process by which differences among learners (learning styles, interest and readiness to learn etc.) are accommodated so that all learners in a group have their best chance of learning. Differentiation could be by task, support and/or outcome. Differentiation, as a way of ensuring

each learner benefits adequately from the delivery of the curriculum, can be achieved in the classroom through:

- Task
- One-on-one support
- Outcome

Differentiation by task involves teachers/facilitators setting different tasks for learners of different ability, e.g. in sketching the plan and shape of their classroom some learners could be made to sketch with free hand while others would be made to trace the outline of the plan of the classroom.

Differentiation by support involves the teacher/facilitators providing a targeted support to learners who are seen as performing below expected standards or at risk of not reaching the expected level of learning outcomes. This support may include a referral to a Guidance and Counselling Officer for academic support.

Differentiation by outcome involves the teacher/facilitator allowing learners to respond at different levels. In this case, identified learners are allowed more time to complete a given task.

Scaffolding in education refers to the use of a variety of instructional techniques aimed at moving learners progressively towards stronger understanding and ultimately greater independence in the learning process.

It involves breaking up the learning episodes, experiences or concepts into smaller parts and then providing learners with the support they need to learn each part. The process may require a teacher/facilitator assigning an excerpt of a longer text to learners to read, engage them to discuss the excerpt to improve comprehension of its rationale, then guiding them through the key words/vocabulary to ensure learners have developed a thorough understanding of the text before engaging them to read the full text.

Common scaffolding strategies available to the teacher/facilitator include:

- giving learners a simplified version of a lesson, assignment, or reading, and then gradually increasing the complexity, difficulty, or sophistication over time;
- describing or illustrating a concept, problem, or process in multiple ways to ensure understanding;

- giving learners an exemplar or model of an assignment, they will be asked to complete;
- giving learners a vocabulary lesson before they read a difficult text;
- clearly describing the purpose of a learning activity, the directions learners need to follow, and the learning goals they are expected to achieve;
- explicitly describing how the new lesson builds on the knowledge and skills learners were taught in a previous lesson.

Organisation of the Curriculum

The Science curriculum has been structured into four columns which are Strands, Sub-strands, Content standards, Indicators and Exemplars. A unique annotation is used for numbering the learning indicators in the curriculum for the purpose of easy referencing. The annotation is indicated in table 2.

Example: B3.2.4.1.2

ANNOTATION	MEANING/ REPRESENTATION
B3	Year or Class
2	Strand Number
4	Sub-strand Number
1	Content Standard Number
2	Indicator Number

Strands are the broad areas/sections of the Science content to be studied.

Sub-strands are the topics within each strand under which the content is organized.

Content standard refers to the pre-determined level of knowledge, skill and/or attitude that a learner attains by a set stage of education.

Indicator is 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 teachers/facilitators in the delivery of the curriculum.

ILLUSTRATION OF CURRICULUM STRUCTURE

Class		Content Standards	Learning Indicators
Strand 1: DIVERSITY OF MATTER			
Sub-strand 1: Living and Non-Living Things			
B1	B2	B3	B4
B1.1.1.1: Show understanding of the physical features and life processes of living things and use this understanding to classify them	B2.1.1.1: Show understanding of the physical features and life processes of living things and use this understanding to classify them	B3.1.1.1: Show understanding of the physical features and life processes of living things and use this understanding to classify them.	B4.1.1.1: Show understanding of the physical features and life processes of living things and use this understanding to classify them
B1.1.1.1.1: Observe and describe different kinds of things in the environment.	B2.1.1.1.1: Describe the physical features of plants (roots, stem, leaves)	B3.1.1.1.1: Group living things into plants and animals based on their physical features	B4.1.1.1.1: Group living things into plants and animals based on their uses

Source: NaCCA, Ministry of Education 2019

STRUCTURE OF CURRICULUM

The Science curriculum is structured to cover B4 to B6 under five strands with a number of sub-strands as shown in the table below:

STRAND	B4	B5	B6
	SUB-STRANDS	SUB-STRANDS	SUB-STRANDS
DIVERSITY OF MATTER	1. Living and Non-Living Things 2. Materials	1. Living and Non-Living Things 2. Materials	1. Living and Non-Living Things 2. Materials
CYCLES	1. Earth Science 2. Life Cycles of Organisms	1. Earth Science 2. Life Cycles of Organisms	1. Earth Science 2. Life Cycles of Organisms
SYSTEMS	1. The Human Body Systems 2. The Solar System 3. Ecosystems	1. The Human Body Systems 2. The Solar System 3. Ecosystems	1. The Human Body Systems 2. The Solar system 3. Ecosystems
FORCES AND ENERGY	1. Sources and Forms of Energy 2. Electricity and Electronics 3. Forces and Movement	1. Sources and Forms of Energy 2. Electricity and Electronics 3. Forces and Movement	1. Sources and Forms of Energy 2. Electricity and Electronics 3. Forces and Movement
HUMANS AND THE ENVIRONMENT	1. Personal Hygiene and Sanitation 2. Diseases 3. Climate Change	1. Personal Hygiene and Sanitation 2. Diseases 3. Science and Industry 4. Climate Change	1. Personal Hygiene and Sanitation 2. Diseases 3. Science and Industry 4. Climate Change

DIFFERENCE BETWEEN THE TRADITIONAL AND LEARNING-CENTRED CLASSROOM

	TRADITIONAL	LEARNING-CENTRED CLASSROOM
1.	Emphasis is on knowledge acquisition.	Emphasis is on the acquisition of skills and competencies.
2.	Learning is limited to the four walls of the classroom.	Learning takes place both in and outside the classroom (school compound, community, home, internet, etc.).
3.	Students constantly face the teacher/facilitator and board.	The classroom is inviting. Desks can be rearranged to promote collaborative as well as independent work.
4.	Teacher/facilitator restricted to provisions in the curriculum.	Gives room for teacher/facilitator innovation.
5.	The teaching and learning tools are limited to pens, pencils, crayons and paper.	The teaching and learning process is enhanced by the use of modern technological gadgets such as smart phones, sound systems, computers, TV sets, smart boards, etc.
6.	The classroom environment is devoid of teacher/facilitator-sponsored TLMs.	The classroom environment is laden with materials for sub-conscious learning.
7.	The teacher/facilitator takes the centre stage and talks more than the learner.	The learner takes active part in the learning process and talks more.
8.	Here, mistakes are sanctioned.	Mistakes are tools for discovery and learning.
9.	Criterion-referenced assessment is emphasised. Learners' progression is based on score in exams.	Relies on different modes of assessment and progression is based on mastery of competency.
10.	Mainly focused on theoretical mode of teaching.	Plethora of learning modes.

Source: NaCCA, Ministry of Education 2019

SCOPE AND SEQUENCE

STRAND	SUB-STRANDS	B6
DIVERSITY OF MATTER	Living and Non-Living Things	✓
	Materials	✓
CYCLES	Earth Science	✓
	Life Cycles of Organisms	✓
SYSTEMS	The Human Body Systems	✓
	The Solar system	✓
	Ecosystems	✓
FORCES AND ENERGY	Sources and Forms of Energy	✓
	Electricity and Electronics	✓
	Forces and Movement	✓
HUMANS AND THE ENVIRONMENT	Personal Hygiene and Sanitation	✓
	Diseases	✓
	Science and Industry	✓
	Climate Change	✓

Source: NaCCA, Ministry of Education 2019

SAMPLE YEARLY SCHEME OF LEARNING – BASIC 6

Weeks	Term 1 (List term 1 Sub-strands)	Term 2 (List term 2 Sub-strands)	Term 3 (List term 3 Sub-strands)
1	Living and non- living things	Earth science	Forces and movement
2	Living and non-living things	Earth science	Forces and movement
3	Living and non-living things	Earth science	Personal hygiene and sanitation
4	Living and non-living things	Life cycles of organism	Personal hygiene and sanitation
5	Materials	Life cycles of organism	Personal hygiene and sanitation
6	Materials	The human body systems	Personal hygiene and sanitation
7	Materials	Ecosystem	Diseases
8	Materials	Sources and forms of energy	Science and industry
9	Earth science	Sources and forms of energy	Science and industry
10	Earth science	Electricity and electronics	Science and industry
11		Electricity and electronics	Climatechange

Source: NaCCA, Ministry of Education 2019

SAMPLE LESSON – BASIC 4

Date: 14/03/2019	Period: Single period	Subject: Science
Duration: One hour	Strand: Energy and Forces	
Class: B4	Class size: 50	Sub-strand: Electricity and Electronics
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.	Lesson: 1 of 1 (Based on the number of the indicator)
Performance Indicator: Learners can demonstrate ways of conserving electricity in the home.		Core Competencies/Values: Personal Development and Leadership; Digital Literacy; Critical Thinking and Problem Solving; Creativity and Innovation; Cultural Identity and Global Citizenship.
Keywords: appliance, gadget		
Phase/Duration	Learners activities	Resources
Phase1: Starter (preparing the brain for learning) 5 minutes	If there is light or an electrical appliance in the classroom or compound, have learners turn it on and explain why it would not be good to leave it on. Teacher asks learners the following question: What makes the fridges and televisions in the home work? Which appliances in the home consume more electricity? How can we reduce electricity consumption in the home?	Pictures of some home appliances Lights or appliances in the room
Phase 2: Main (new learning including assessment) 20 minutes	Activity - Ask learners to explain why their parents put off lights, televisions and other electrical appliances when leaving the house. - Discuss with learners what happens when electrical gadgets such as heaters and pressing irons are left on when leaving the house. - Learners work in groups to discuss activities that contribute to wastage of electricity. - Learners present their ideas to class for discussion. Assessment - What appliances use the most energy in the home? - What are some ways you can conserve energy in your home? - What are some examples of energy-conscious products?	Pictures of some home appliances Lights or appliances in the room

	Project: Monitoring electricity consumption in the home. Learners record the amount of electricity they consume in their homes per month for three (3) months and report on their findings. Which month did they consumed most electricity and why? Bottle tops straws, sticks, shells and any other material that can be used for counting in the environment.	
Phase 3: Plenary/ Reflections (Learner and teacher) 5 minutes	Teacher facilitates the group discussions by chipping in from time to time since this topic will seem a bit abstract to most learners. Teacher sums up the learning outcomes.	

Source: NaCCA, Ministry of Education 2019

1

Strand:

Diversity of matter

Strand I: DIVERSITY OF MATTER

Sub-strand I: LIVING AND NON-LIVING THINGS

LESSON 1: The root system of plants

LB: pages 6 - 10 ; WB: pages 6 - 7

CONTENT STANDARDS:

B6.1.1.1 Show an understanding of the physical features and life processes of living things and use this understanding to classify them.

INDICATOR:

B6.1.1.1.1 Classify plants based on their root system.

LEARNING EXPECTATIONS

Learners will:

- ◆ Identify the main types of root systems in plants.
- ◆ Distinguish between the fibrous and taproot systems.
- ◆ Identify common plants that have fibrous and tap root systems.

NEW WORDS

Roots, taproot, fibrous root.

RESOURCES

Pictures of plants with different roots.

CORE COMPETENCIES

Critical thinking and Problem-Solving
Communication and Collaboration
Creativity and Innovation

SUBJECT SPECIFIC PRACTICES

Observing, Communicating, Planning
Analysing, Designing, Interpreting

HELPFUL LINKS

- ◆ <https://classnotes.org.in/class-6/science/getting-to-know-plants/root-stem-and-leaf/>
- ◆ <https://youtu.be/AhcHhZ5r2Ok>

The roots are the part of the plant that support it to be able to stand firmly in the soil. Plants also absorb water and nutrients from the soil through their roots.

Different plants have different roots. We are able to classify plants based on the roots they have. Plant roots are classified into fibrous and tap root systems.

Starter

Ask learners to uproot some plants around the school compound and name the parts.

Drill learners on the correct pronunciation and meanings of the new words.

Teaching instructions

Activity 1

Differences between tap and fibrous root systems

- Put learners into groups of five. Task them to work under the assistance of a leader to uproot different young plants around the school. (Carefully uproot the plants so that the roots do not get damaged).
- Ask each group to observe the roots of the different plants they have gathered.

Activity 2

- The group members should work together to classify each root as fibrous or tap root.
- Each of them should identify any differences between the tap and fibrous root systems.
- Let them share their findings with the rest of the class.

Talk about

Refer learners to the 'Talk about' questions for discussion on page 10 of the Learner's Book.

"Why are grasses grown on bare lands in front of buildings?"

Background information

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

What I have learnt

You may write the following on the chalk board as a summary, or refer learners to page 10 of the Learner's Book to read.

1. The roots of a plant help to support the plant and also enable it to absorb water and nutrients from the soil.
2. Tap roots are made of one long root having smaller branches. *Examples of plants with tap roots are mango tree, neem tree.*
3. Fibrous roots are made of similar roots that are shallow and grow close to the surface of the soil. *Examples of plants with fibrous roots are wheat, rice, onion and maize.*

Project for home or school

Refer learners to page 10 of the Learner's Book. They are to identify the names of common plants near their homes and school. They should search on the internet and find out whether those plants have fibrous or tap roots.

Assessment for learning

Supervise learners to do the assessment tasks. Refer them to pages 9 - 10 of the Learner's Book and pages 6 - 7 of the Workbook.

Answers to review exercises

- 1 a. True b. True
c. False d. False
e. False
- 2 Tap root: dandelions, carrots, beetroots, turnips, oak, mango and neem.
Fibrous roots: wheat, rice, banana, onion, corn and grass.

3	Tap Root	Fibrous Root
	There is one large, long root	There is not one large, long root
	Penetrates deeply into the soil	Does not penetrate deeply, is shallow
	Found in dicots	Found in monocots
	Can act as a storage organ for food in some cases	Never acts as a storage organ for food
	Can reach water at great depths	Can't reach water at great depths
	Does not develop from the stem	Develops from the stem
	Smaller roots develop from the main root	Has no main roots from which smaller roots develop

4 Fibrous root → b and e.

Tap root → a, c and d

5. i. a. maize.
ii. c. turnip.
Turnip has tap roots. The rest have fibrous roots.
iii. Tap roots.
iv. Any fibrous crop: wheat, rice, banana, onion, corn and grass.

Answers to workbook

Trial 1

1 Learners to draw

Trial 2

1. i. a. maize.
ii. c. turnip.
Turnip has tap roots. The rest have fibrous roots.
iii. Tap roots.
iv. Any fibrous crop: wheat, rice, banana, onion, corn and grass.

Trial 3

1. i.

Tap Root	Fibrous Root
There is one large, long root	There is not one large, long root
Penetrates deeply into the soil	Does not penetrate deeply, is shallow
Found in dicots	Found in monocots
Can act as a storage organ for food in some cases	Never acts as a storage organ for food
Can reach water at great depths	Can't reach water at great depths
Does not develop from the stem	Develops from the stem
Smaller roots develop from the main root	Has no main roots from which smaller roots develop

- ii. Wheat, rice, banana, onion, corn and grass
- iii. Dandelions, carrots, beetroots, turnips Oak, Mango and neem.

Strand I: DIVERSITY OF MATTER

Sub-strand 2: MATERIALS

LESSON 1: Properties of metals

LB: pages 11 - 17; WB: pages 8 - 10

CONTENT STANDARDS

B6.1.2.1 Recognise materials as important resources for providing human needs.

INDICATOR

B6.1.2.1.1 Know the general properties of metals such as lustre, malleability, conductivity and ductility.

LEARNING EXPECTATIONS

Learners will:

- ♦ Name some examples of metals.
- ♦ Describe the properties that different metals have in common.

NEW WORDS

Metals, lustre, malleability, conductivity, ductility.

RESOURCES

Wood, plastic, pictures or videos of different metals including aluminium, dry cell, bulb, plastic cup, piece of wood, aluminium saucepan, steel wool, sticks.

CORE COMPETENCIES

Critical thinking and Problem-Solving
Digital Literacy
Communication & Collaboration

SUBJECT SPECIFIC PRACTICES

Observing, Communicating
Analysing, Generalising

HELPFUL LINKS

- ♦ <https://www.onlinemathlearning.com/metal-properties.html>
- ♦ <https://youtu.be/4gpEAj-Veio>

Starter

Ask learners to mention some examples of metals they know. Let them state what they know about them. Ask them to mention some examples of items that were made from metals.

Drill learners on the correct pronunciation and meanings of the new words.

Teaching instruction

Activity 1

Investigating the connectivity of metals

- Put learners into groups of five. Guide them to build a circuit using the dry cells, bulb and a nylon rope as the connecting wire. Let them discuss what happens. (The bulb does not light up. This shows that non-metals are not conductors of electricity).
- Ask learners in their groups to light a bulb using dry cells and the connecting wire. Let them discuss what they see. (The bulb lights up. This shows that metals are good conductors of electricity).

Activity 2

Investigating the ability of metals to lustre

- Put learners into groups of four. Give them steel wool to polish the surface of an aluminium pan.
- Let them observe and tell you what happens. (The pan looks very shiny. This shows metals are lustrous).

Activity 3

Investigating the sonority of metal

- Ask learners to work in pairs. They strike a piece of wood with a stick.
- They strike the aluminium pan with a stick. Let them observe the different sounds. (They will observe that metals make higher sounds than non-metals).

Activity 4

Investigating the hardness of metals

- Still in their groups ask learners to break a small piece of stick with their hands. Were they able to break it?

Background information

Metals are one of the most useful materials in our communities. Based on their properties they are used for making different artefacts and goods.

- Afterwards ask them to break a metallic spoon with their hands. Were they successful? Let them tell you what they observed. (They will not be able to break the metallic spoon because metals are very hard).

Talk about

Help learners to give responses to the 'Talk about' questions on page 13 of the Learner's Book.

“Why are metals used for making jewelry?”

What I have learnt

You may write the following on the chalk board as a summary, or refer learners to page 17 of the Learner's Book to read.

1. Metals are important materials that are used to make many different objects.
2. The properties of metals enable us to use them for various purposes.
3. Metals have properties such as lustre, malleability, conductivity and ductility.

Project for home or school

Learners are to find out the different ways that metals are used in their homes and identify the property of metals that allow it to be used for that purpose.

Refer them to page 17 of the Learner's Book.

Assessment for learning

Supervise learners to do the assessment tasks.
Refer them to pages 15 - 16 of the Learner's
Book and pages 8 - 10 of the Workbook.

Answers to review exercises

Exercise 1

1.
 - i. a. Malleability
 - ii. b. Graphite
 - iii. a. Iron
 - iv. c. Ductility
 - v. c. Aluminium
 - vi. c. Conductors
2.
 - a. lustre
 - b. ductile
 - c. malleability
 - d. good conductors
 - e. conductivity

3. i. Malleable → Can be stretched into sheets
- ii. Ductile → Can be drawn into wires
- iii. Lustrous → Can be polished to show shiny silvery surfaces
- iv. Conductor → Allows electricity to pass through it easily
- v. High tensile strength → Is able to resist breaking

4.

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					E									

Answers to workbook

Trial 1

1. i. high tensile strength
- ii. conductor
- iii. ductile
- iv. malleable
- v. lustrous

- 2.. i. aluminium
- ii. any metal at all
- ii. copper, aluminium
- iv. aluminium, gold, silver
- v. iron

Trial 2

- malleability
- ductility
- lustre

Trial 3

Metal → roofing sheets, iron nails , pins, knives, keys, gong-gong, connecting wires, cooking pans, stapeler, cups.

Non metals → plastic ruler, erasers, exercise, books, comb, plastic bowls.

LESSON 2: Uses of metals

LB: pages 18 - 24. WB: pages 11 - 12

CONTENT STANDARDS

B6.1.2.1 Recognise materials as important resources for providing human needs.

INDICATOR

B6.1.2.1.1 Investigate the uses of metals in everyday life and link the uses to their properties.

LEARNING EXPECTATIONS

Learners will:

- Describe some of the everyday uses of metals.
- Explain why the metals are used because of their properties.

NEW WORDS

Metals, lustre, malleability, conductivity, ductility.

RESOURCES

Pictures of different items made from metals, cardboard, coloured markers.

CORE COMPETENCIES

Critical Thinking and Problem-Solving
Digital Literacy
Communication & Collaboration

SUBJECT SPECIFIC PRACTICES

Observing, Communicating
Analysing, Generalising

HELPFUL LINKS

- <https://youtu.be/Tk4t-v3ZrdI>
- <https://byjus.com/chemistry/uses-of-metals/>

Background information

Metals are hard, lustrous, malleable and good conductors of heat and electricity.

These properties of metals enable them to be used in making different goods and objects. Aluminium is used to make roofing sheets because it is malleable, which means it can be spread into sheets.

Starter

Ask learners to mention some home items that were made from metals.

Drill learners on the correct pronunciation and meanings of the new words.

Teaching instructions

Activity 1

Properties of metals

- In pairs ask learners to find out the ways by which metals are used in their homes and community.
- Have them go round the school and identify different ways that metals have been used in the school.
- Let them write down their observations and share with others.
- Task them to work with their partners to identify the property of metals that enables them to be used for those purposes. Examples, for making the school bell, electrical wires in the classroom, saucepan in the home, etc.
- Let them share their answers with the rest of the class.

Activity 2

Designing a concept map on properties and uses of metals

Put learners into group of five. Give them the following materials: cardboard, coloured markers.

- Ask them to design a concept map on uses and properties of metals.
- Let them relate the uses of metals to each of the properties they identified.

Talk about

Refer learners to the 'Talk about' questions for discussion on page 24 of the Learner's Book. Iron is used for building homes, but it is not good for making jewellery. Explain why?

What I have learnt

You may write the following on the chalk board as a summary, or refer learners to page 24 of the Learner's Book to read.

1. Metals are very useful to humans.
2. We use metals to produce goods such as cars, roofing sheets, coins, wires, and jewellery.
3. The uses of metals are based on their properties such as hardness, malleability, lustre and conductivity.

Project for home learning

Learners are to find out the different ways that metals are used in their homes and answer the question.

Also refer them to page 24 of the Learner's Book for their project stated below.

Project

Design toy cars, graters, dust pans, knives, shovels and spoons using metallic object such as milo, sardine, turpentine and milk tins.

Assessment for learning

Supervise learners to do the assessment tasks. Refer them to pages 22 - 23 of the Learner's Book and pages 11 - 12 of the Workbook.

Answers to review exercises

Exercise 1

1

- a. **Iron:** for making cutlasses and knives, cutlery, and construction of bridges and houses.
- b. **Silver:** for making jewellery
- c. **Copper:** Copper is a metal that often used for making wires because it is a very good conductor of electricity.
- d. **Gold:** for making jewellery or ornaments
- e. **Aluminium:** for making roofing sheets, cables, chocolate foils, cooking pans or parts of aeroplanes.

2. properties
jewellery
wires
malleable
copper

Exercise 2

1. i. b. they are brittle
ii. a. Roofing sheets
iii. b. iron
iv. d. for making clothes
v. a. the metal does not have high tensile strength

Exercise 3

1

Use	Property of Metal
For making shiny coins	Lustrous
For making cooking pans	Conductor of heat
For roofing our homes	malleable
For making parts of cars and trains	strong
For making rings and necklaces	Lustrous

2. i. aluminium or copper
ii. aluminium or iron
iii. gold, silver, copper
iv. iron
v. copper, silver, gold,

Answers to workbook

Trial 1

1. i. lustrous
ii. conductor of heat
iii. malleable
iv. high tensile strength
v. lustrous
2. i. aluminium or copper
ii. aluminium or iron
iii. gold, silver, copper
iv. iron
v. copper, silver, gold,

Trial 2

1. properties
2. malleable
3. jewelry, lustrous.
4. strong

LESSON 3: Uses of mixtures

LB: pages 25 - 31; WB: pages 13 - 14

CONTENT STANDARDS

B6.1.2.2 Understand mixtures, the types, uses and ways of separating them into their components.

INDICATOR

B6.1.2.2 .1 Examine some uses of mixtures in everyday life.

LEARNING EXPECTATIONS

Learners will:

- Describe some common mixtures and where they can be found.
- Describe the uses of common mixtures.

NEW WORDS

Stainless, cutlery

RESOURCES

Pictures or videos of examples of mixtures, clay, water, soap, salt, sugar, milo.

CORE COMPETENCIES

Critical Thinking and Problem-Solving
Digital Literacy
Communication & Collaboration

SUBJECT SPECIFIC PRACTICES

observing, communicating, analyzing,

HELPFUL LINKS

- <https://youtu.be/pM-7ehDQknl>

Background information

Mixtures are formed from the combination of two or more materials or substances.

Mixtures are found to serve many different purposes in homes, communities and industries.

Starter

Ask learners to mention some examples of mixtures and their components. Let them state what they use the mixtures for. Example: gari soakings.

Drill learners on the correct pronunciation and meanings of the new words.

Teaching instructions

Activity 1

Preparation and uses of mixtures

- Put learners in groups of five. Give each group the following materials: clay, water, soap, salt, sugar, milo.
- Guide them to mix the materials provided to form wet clay, salt solution, beverage and soapy solution.

Activity 2

- Guide learners to use the wet clay to design small pots, ovens and cups.

Activity 3

- Demonstrate how to use the soapy water in washing of hands for learners to observe and do same.
- Let learners drink the beverage they have prepared.

Talk about

Refer learners to the 'Talk about' question on page 29 of the Learner's Book.

"We have learnt about different mixtures."

"Which use of mixtures is most important?"

What I have learnt

You may write the following on the chalk board as a summary, or refer learners to page 31 of the Learner's Book to read.

- Air is a natural mixture of gases.
- Sea water is mixture of water and salt.
- Mixtures are formed by mixing different substances together.
- Examples of common mixtures are the air we breathe, concrete, beverage, salt solution and muddy water.
- Mixtures are used for many purposes including preparation of food, building of homes, making pottery and preservation of food.

6. Alloys are mixtures made from metals. They are used for making jewels, statues, coins and cutlery.

Assessment for learning

Supervise learners to do the assessment tasks. Refer them to pages 30 - 31 of the Learner's Book and pages 13 - 14 of the Workbook.

Answers to review exercises

Exercise 1

1. a. substances.
b. construction.
c. alloys.
d. stainless steel
e. salt solution.
2. i. Salt solution
ii. Muddy water
iii. Sand and stone
iv. Corn dough and water
v. Gari and sand
vi. Concrete
vii. Sugar solution
- b. i. Salt solution: preparing food, preserving fish, preparing soap.
ii. Muddy water: making pottery, building houses, statues, tripod stoves.
iii. Sand and stone: construction/ making concrete.
iv. Corn dough and water: preparing food.
v. Groundnut and sand: preparing roasted groundnut.
vi. Concrete: building/construction of homes, bridges drains, statues, etc
vii. Sugar solution: preparing beverages.
3. a. petroleum or crude oil
b. sugar solution, water and milk (water and milo or wate rand any chocolate beverage).
c. muddy water
d. salt solution/ salty water
e. stainless steel

Exercise 2

1. i. Steel is used for building houses, bridges and parts of vehicles.
ii. Welders use an alloy called solder for welding.
iii. Stainless steel is another alloy for making cutlery and brass for making instruments is also an alloy. Statues are

made of bronze, which is also a mixture of different metals.

2. i. a. Salt solution
ii. d. jewellery
iii. c. crude oil
iv. a. Making of saucepans
v. d. for separating water from alcohol

Answers to workbook

Trial 1

1. i. petroleum or crude oil
ii. sugar solution, water and milk (water and milo or wate rand any chocolate beverage).
iii. muddy water
iv. salt solution/ salty water
v. stainless steel

Trial 2

1. i. Steel is used for building houses, bridges and parts of vehicles.
ii. Welders use an alloy called solder for welding.
iii. Stainless steel is another alloy for making cutlery and brass for making instruments is also an alloy. Statues are made of bronze, which is also a mixture of different metals.
2. a. i. for making pottery
ii. building mud houses
iii. making earthen ware
iv. making local tripod stoves
- b. i. For making food
ii. For preserving food such as fish
iii. For nursing wounds
iv. For preparing soap
- c. i. For building houses
ii. Constructing statues
iii. Building bridges

2

Strand:

Cycles

Strand 2: CYCLES

Sub-strand I: EARTH SCIENCE

LESSON 1: The relative sizes of the sun and earth

LB: pages 34 - 38; WB: pages 16 - 18

CONTENT STANDARDS

B6.2.1.1 Recognise the relationship between the earth and the sun.

INDICATOR

B6.2.1.1 Describe the relative sizes of the earth and sun and their importance.

LEARNING EXPECTATIONS

Learners will:

- ◆ Describe the sun as the centre of the solar system.
- ◆ Describe the size of the earth in comparison to the sun.
- ◆ Discuss the importance of the sun's size to life on earth.

NEW WORDS

Solar system, earth, sun

RESOURCES

The picture of the sun and the earth, paper/clay/play dough, card board or plywood.

CORE COMPETENCIES

Critical Thinking and Problem-Solving
Digital Literacy
Communication & Collaboration

SUBJECT SPECIFIC PRACTICES

Designing Experiment, Planning,
Communicating, Observing, Analysing

HELPFUL LINKS

- ◆ <https://youtu.be/riMAITbLqZI>

Starter

Ask learners to tell you when they see the Sun. Let them tell you the importance of the Sun.

Drill learners on the correct pronunciation and the meanings of the new words.

Teaching instructions

Activity 1

The movement of the Earth, Sun and Moon

- Put learners into groups of three. Let one stand in the middle and act as the Sun.
- The second person moves around the Sun in a clockwise manner.
- Let the third person represent the Moon and move around the second person.
- Let learners know that this is how the Earth moves around the Sun.

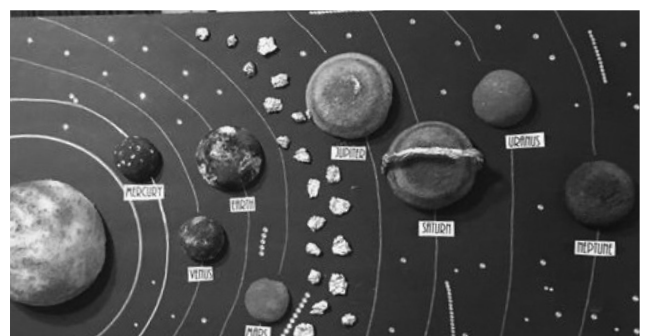
Activity 2

Designing the Solar System

- Put learners into groups of six. Give each group the following materials: Paper/clay/play dough, card board or plywood.
- Direct each group to mould paper, clay or play dough into round balls.
- Let them make balls of different sizes to represent the Sun, Earth, Moon and other planets in order.

Activity 3

- Let them label each of the round balls after the various bodies in the solar system.
- They colour a plywood or cardboard and arrange the solar system parts/planets on it.



Background information

The Sun provides us with heat and light. The earth and other planets move round the Sun which is the centre of the solar system. The Sun is the closest star to the earth. Standing on the earth, the Sun may look so small.

Talk about

Refer learners to the 'Talk about' question on page 36 of the Learner's Book.

"Assuming the earth was bigger than the sun, will that affect the formation of day and night?"

What I have learnt

You may write the following on the chalk board as a summary, or refer learners to page 38 of the Learner's Book to read.

7. The Sun is at the centre of the solar system and is the largest body within the solar system.
8. The Sun is far bigger than the earth.
9. The Sun looks small because it is far away from the Earth.

Assessment for learning

Supervise learners to do the assessment tasks. Refer them to page 37 - 38 of the Learner's Book and page 16 - 18 of the Workbook.

Answers to review exercise

Exercise 1

1. i. The sun
ii. Jupiter, Saturn, Neptune and Uranus
iii. Mars, venus, mercury.
iv. 365 days.
v. The sun.
2. i. false
ii. false
iii. false
iv. true
v. false

3. i. a. Mercury
b. Venus
c. Earth
d. Mars
e. Jupiter
f. Saturn
g. Uranus
h. Neptune

ii. Jupiter, Saturn, Uranus and Neptune
iii. Mars, Venus and Mercury
iv. The sun.
v. The moon
4. Picture: three circular bodies of different sizes: A is the medium sized circle , B is the large sized circle, C is the small sized circle

Answers to workbook

Trial 2

1. a. true
b. false
c. false
d. true
e. false

Trial 3

1. i. Spinning of the earth on its axis as it moves around the sun.
b. 24 hours
c. The sun
d. 365 days
e. The sun

LESSON 2: Formation of rain

LB: pages 39 - 45; WB: pages 19 - 20

CONTENT STANDARDS

B6.2.1.2 Show an understanding of the roles of condensation, evaporation, transpiration and precipitation in the hydrological (water) cycle.

INDICATOR

B6.2.1.2.1 Explain how rain falls from clouds.

LEARNING EXPECTATIONS

Learners will:

- ♦ Describe the processes involved in the formation of rain.
- ♦ Describe how the clouds help to bring about rain.
- ♦ Explain dew point.

NEW WORDS

Rainfall, clouds, condensation, evaporation, transpiration and precipitation, dew point

RESOURCES

Pictures or videos of water falling from clouds. Picture showing rain drops on a leaf, a glass jar, black paper, tape, warm water, ice cubes, small metal bowl, metal baking sheet, paper cup, plastic zip-top bag, tape, water.

CORE COMPETENCIES

Communication and Collaboration
Personal Development and Leadership

SUBJECT SPECIFIC PRACTICES

Observing
Planning

HELPFUL LINKS

- ♦ <https://youtu.be/zBnKgwnn7i4>
- ♦ <https://classnotes.org.in/class-6/science/water/water-cycle-2/>

Background information

Rain is a form of precipitation. **Precipitation** is when tiny suspended particles in a medium gather and fall to the bottom. Droplets of water gather and fall. This precipitation can fall as rain, snow, hail or sleet.

Water is in the atmosphere, on land, in the ocean and even underground. It gets used over and over and over again through what is called the **water cycle**. In the water cycle, water from the earth moves to the clouds, falls back to the earth and moves up again in an unending cycle.

Water vapour gets into the atmosphere through a process called evaporation. The water vapour rises in the atmosphere and there it cools down and forms tiny water droplets through a process called **condensation**.

Many of these tiny droplets of clouds join together to form big clouds. Later they become too heavy to stay up there in the air. They finally fall to the earth as rain.

Starter

Ask learners to explain how the cloud looks like when it is about to rain. Let them recite the rhyme on rain rain go away.

Rhyme

Rain rain go away
Go and come another day
Little children want to play
Rain rain go away

Drill learners on the correct pronunciation and the meanings of the new words.

Teaching instructions

Activity 1

Making a cloud in a jar

- Put learners into groups of five. Give the following materials to each group: a glass jar, black paper, tape, warm water, ice cubes, small metal bowl or a metal baking sheet (should completely cover the opening of the jar) a match, a flashlight (optional).
- Guide learners to cut the black paper to fit halfway around the jar, leaving about one inch of space at the bottom of the jar. Tape it in place on the jar.
- Let them fill the jar to about 2 inches full with warm water.

- Let them fill the metal bowl or tray with ice cubes.
- Light a match and hold it inside the jar for a few seconds and then drop it into the water. Ask learners to quickly cover the jar with the container of ice cubes.

Activity 2

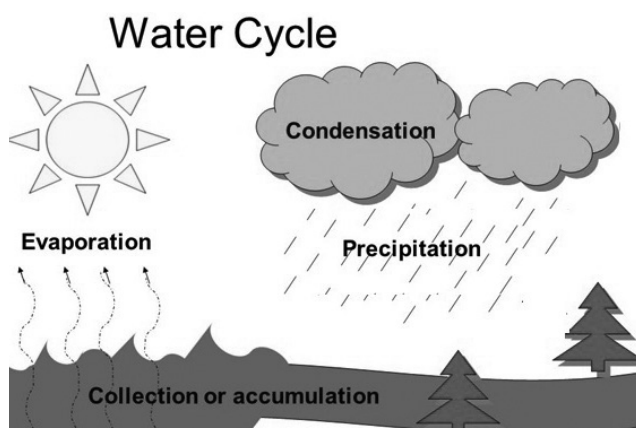
- Ask learners to look into their jar from the opposite side (so that the black paper makes a background at the other side of the jar). Let them observe what happens. (They should start to see a cloud forming. As the cloud gets bigger, it will be easier to see. To see the cloud even better, turn off the lights and turn on flashlight into the jar towards the black paper).
- Ask them to take the container of ice cubes off the jar and watch what happens (the cloud rise up and disappear).

Activity 3

The water cycle

In this experiment, learners will see how water from the ground gets into the air to form clouds and then falls back to the ground as rain.

- Put learners into groups of five and give them the following materials: Paper cup, plastic zip-top bag (large enough to hold the cup standing up) tape, water.
- Let them fill the cup to about 1/4 full with water.
- Let them carefully set the cup inside the plastic bag and zip it.
- Ask them to tape the bag with the cup inside to a window where a lot of sun comes in.
- Let them observe the cup and bag throughout the day and watch what happens.



Talk about

Refer learners to the 'Talk about' question for discussion on page 43 of the Learner's Book. "Why is it that sometimes we do not experience rainfall for a long time?"

What I have learnt

You may write the following on the chalk board as a summary, or refer learners to page 44 of the Learner's Book to read.

6. Rain is a precipitation of water from the atmosphere.
7. Rain is formed when droplets of water become heavy and fall from the sky.
8. Water on earth receives heat and evaporates into the sky.
9. There is also transpiration in plants.
10. The higher you go the cooler it becomes.
11. The water in the sky condenses into water droplets.
12. They form clouds in the sky. The clouds move around and finally precipitates as rain.
13. Rain is an important part of the water cycle.

Project for home or school

Learners are expected to design a poster on evaporation. Refer them to page 43 of the Learner's Book.

Assessment for learning

Supervise learners to do the assessment tasks. Refer them to pages 43 - 44 of the Learner's Book and pages 19 - 20 of the Workbook.

Answers to review exercises

Exercise 1

1. i. C. from C to D
ii. A. from A to B
iii. A. from A to B

Exercise 2

1. a. change of state of water from liquid to water vapour
b. this happens when water in the clouds changes from vapour and falls as rain, snow, hail or sleet.
c. rain, snow, hail or sleet.

Exercise 3

1. i. Precipitation
- ii. The water cycle
- iii. Evaporation
- iv. Condensation.

Answers to workbook

Trial 1

1. i. precipitation
- ii. Water cycle
- iii. evaporation
- iv. condensation
- v. clouds

2. a. false
- b. true
- c. false
- d. true
- e. true

3. a. Evaporation
- b. Condensation
- c. Precipitation

LESSON 3: Functions of carbon

LB: pages 46 - 50; WB: page 21

CONTENT STANDARDS

B6.2.1.3 Demonstrate an understanding of how carbon and nitrogen are cycled in nature.

INDICATOR

B6 2.1.3.1 Know the functions of carbon within the environment.

LEARNING EXPECTATIONS

Learners will:

- ♦ Describe some common sources of carbon in the environment.
- ♦ Describe the common uses of carbon.

NEW WORDS

Carbon, atmosphere

RESOURCES

Pencil, charcoal, chalk, jewellery and pictures of diamond, a sea shell.

CORE COMPETENCIES

Communication and Collaboration
Personal Development and Leadership

SUBJECT SPECIFIC PRACTICES

Observing
Planning

HELPFUL LINKS

- ♦ <https://byjus.com/chemistry/carbon-and-its-importance/>
- ♦ <https://youtu.be/ULiLt2rtpAg>

Background information

Carbon is one of the elements we have in our periodic table. It is found in our pencils. It can also be seen in human beings and other living things.

The component of air we breathe out is called carbon dioxide (CO₂). As the name suggests, carbon dioxide contains the element carbon. It is a chemical combination of carbon and oxygen.

Starter

Let learners breath in and out five times. Let them tell you what they breath in and what they breath out.

Drill learners on the correct pronunciation and the meanings of the new words.

Teaching instructions

Activity 1

- Show pictures of different substance that contain carbon to learners.
- Tell them the sources of these substances (Refer to page 45 of the Learner's Book).
- Task learners to form a concept map on the sources of carbon using the information you gave them.

Activity 2

Carbon dioxide and their uses

- In groups of four, gather different materials that contain carbon. Example, limestones, pencils, charcoal, chalk.
- Describe how we use of each of the materials you have gathered. Example, pencil for writing.

Talk about

Refer learners to the 'Talk about' question for discussion on page 47 of the Learner's Book. "Can human beings and animals live without carbon?"

What I have learnt

You may write the following on the chalk board as a summary, or refer learners to page 48 of the Learner's Book to read.

1. Carbon is a common element on earth.
2. The sources of carbon include charcoal, egg shells, limestone and carbon dioxide.
3. Carbon is important to humans, plants and animals.
4. Carbon is used in making pencils, jewelry and steel.
5. Carbon is found in fuels.

Project for home or school

Learners are expected to design a poster on some functions of carbon within the environment. Refer them to page 48 of the Learner's Book.

Assessment for learning

Supervise learners to do the assessment tasks. Refer them to pages 47 - 48 of the Learner's Book and page 21 of the Workbook.

Answers to review exercises

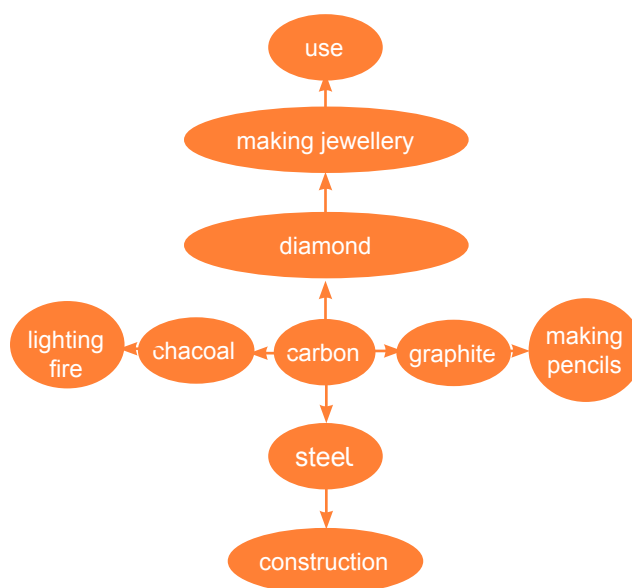
Exercise 1

1. All plants and animals, sea shells, oyster shells, limestones fossil fuels, charcoal, pencils.
2.
 - i. Carbon in the form of coal, is used as a fuel.
 - ii. Carbon in the form of graphite is used for making pencils and dry cells.
 - iii. Diamond is a form of carbon. It is used in jewelry and because they are so hard it is used for cutting, and polishing.
 - iv. Carbon is used as the black pigment in printing ink.
 - v. Carbon is mixed with metals such as iron to make steel which is used in construction.
 - vi. The stainless steel used for making utensils also contains carbon

Exercise 2

1.
 - a. Graphite
 - b. Diamond
 - c. Steel
 - d. Charcoal
 - e. Stainless steel

Exercise 3



Answers to workbook

Trial 1

1.
 1. Charcoal → fused as fuel in coal pots
 2. Stainless steel → for making utensils
 3. Graphite → for making pencils
 4. Steel → for building bridges
 5. Diamond → for making jewellery

Trial 2

1. in this order:
 - element
 - diamond
 - graphite
 - steel
 - construction

LESSON 4: Conservation of water

LB: pages 51 - 53; WB: pages 22

CONTENT STANDARDS

B6.2.1.4 Recognise water and air as important natural resources

INDICATOR

B6.2.1.4.1 Investigate ways of conserving water in the home, school and community

LEARNING EXPECTATIONS

Learners will:

- ◆ List and describe the various uses of freshwater
- ◆ Explain why it is important to use water wisely
- ◆ Describe ways of saving water

NEW WORDS

Conservation, waste

RESOURCES

Pictures or videos showing a boy drinking water, a girl cooking with water, a boy brushing the teeth with water in a cup, a man washing car in a river, a car dumping rubbish into water body, cardboard, paper, poster colours, pencils.

CORE COMPETENCIES

Communication and Collaboration
Personal Development and Leadership

SUBJECT SPECIFIC PRACTICES

Observing, Planning

HELPFUL LINKS

- ◆ <https://youtu.be/yPzf9NwghqE>
- ◆ <https://classnotes.org.in/class-6/science/water/conservation-of-water/>

Background information

Water is one of the most important things in this world. Without water, there will be no life. We need water for everyday activities such as drinking, cooking, bathing, washing and watering of crops. Because water is so important to us, we need to use it wisely and avoid wasting it.

Conservation means prevention of wasteful use of a resource such as water, electricity or land. Water conservation is the practice of using water efficiently to reduce unnecessary water usage.

Starter

Ask learners to tell you what they do when it is announced that their source of water will be disconnected for a number of days.

Drill learners on the correct pronunciation and the meanings of the new words.

Teaching instructions

Activity 1

Designing posters on water conservation

- Put learners into groups of five and give them the following materials: cardboards or A4 sheets, poster colours, pencils.
- Ask them to write down simple messages on water conservation on the cardboard or A4 sheet.
- They can write messages such as Water is Life, Use Water Wisely, Avoid Wasting Water, etc.
- Let them colour their posters beautifully and paste them on the classroom wall.
- Take them through a discussion on their designs.

Talk about

Refer learners to the 'Talk about' question for discussion on page 52 of the Learner's Book. "Why is it necessary for us to save water?"

What I have learnt

You may write the following on the chalk board as a summary, or refer learners to page 53 of the Learner's Book to read.

6. Because water is very important, we need to use it wisely in order to prevent it from being wasted.

Project for home or school

Learners are expected to create a flyer on good ways of using water. Let them write a good message under the picture.

Assessment for learning

Supervise learners to do the assessment tasks. Refer them to page 53 of the Learner's Book and page 22 of the Workbook.

Answers to review exercises

Exercise 1

1. Water conservation is the practice of using water efficiently to reduce unnecessary water usage.
2.
 - Turn off the tap while brushing your teeth.
 - Turn off the tap while washing your hands.
 - Flush with less water.
 - Don't run the dishwasher or washing machine until it's full.
 - Shower with less water.
 - Use a bucket to clean the floors.
 - Use a bucket and sponge to clean the car.
 - Use a watering can to water the plants.
 - Water your lawn only when you need to.
 - Check your toilet for leaks.
 - Capture rainwater.
3. In this order:
 - resource
 - bathing
 - wasting
 - conserve
 - wisely

4.
 - a. correct
 - g. correct
 - h. Wrong
 - i. Wrong

Answers to workbook

Trial 1

1.
 - a. Using too much water in bathing.
 - b. Leaving the taps opened after use.
 - c. Using water hose instead of bucket to wash cars.
 - d. Watering the lawn or grass many times within a day.
 - e. Using too much water to wash clothes.
2.
 - Turn off the tap while brushing your teeth.
 - Turn off the tap while washing your hands.
 - Flush with less water.
 - Don't run the dishwasher or washing machine until it's full.
 - Shower with less water.
 - Use a bucket to clean the floors.
3.
 - Use a bucket to clean the floors.
 - Use a bucket and sponge to clean the car.
 - Use a watering can to water the plants.
 - Water your lawn only when you need to.
 - Check your toilet for leaks.
 - Capture rainwater.
4.
 - There will not be enough water for human, animals and plant use.
 - We will pay more bills.

LESSON 5: Air supports burning

LB: pages 54 - 56; WB: pages 23 - 24

CONTENT STANDARDS

B6.2.1.4 Recognise water and air as important natural resources

INDICATOR

B6.2.1.5.2 Demonstrate that air supports burning

LEARNING EXPECTATIONS

Learners will:

- ♦ Name the substances in the composition of air.
- ♦ State that oxygen is the component of air that support burning.

NEW WORDS

Burning, oxygen, carbon dioxide, nitrogen.

RESOURCES

Picture or video of fire being used for cooking and fire being used to burn rubbish.

CORE COMPETENCIES

Communication and Collaboration
Personal Development and Leadership

SUBJECT SPECIFIC PRACTICES

Observing, Planning

HELPFUL LINKS

- ♦ <https://www.toppr.com/guides/chemistry/environmental-chemistry/different-uses-of-air/>
- ♦ https://www.youtube.com/watch?v=_8keyQte2E0

Background information

Air surrounds us everywhere on this planet. Among the basic needs of all living things such as water, food, sunlight and air, the most important is air. Air is a mixture of different gases. It is made up of gases like oxygen, nitrogen, carbon dioxide and water vapour.

The part of air that we take in is called oxygen. It is the part that helps burning to take place. Without air, we will not be able to make the fire that we use to cook food and for other purposes. This is because the fire will go off if there is no air or oxygen around.

Starter

Let learners mention how fire is used in their homes.

Drill learners on the correct pronunciation and meanings of the new words.

Teaching instructions

Activity 1

Air supports burning

- Put learners into groups of five. Give each group the following materials: candle, matches, a bowl of water.
- Ask learners to place a candle in a bowl. Let them light the candle and fill the bowl with water.
- Let learners tell you what they see. (The candle starts shining).
- Ask them to cover the candle with the transparent glass. Let them tell you what will happen. (They will notice that the lighted candle goes off after some time and the water level rises in the glass).
- Let learners know that the component oxygen of air inside the glass is used up in burning. Therefore, water occupies that space. This shows that air supports burning.

Talk about

Refer learners to the 'Talk about' question for discussion on page 55 of the Learner's Book. "Why do the fire service sometimes put off fire using thick blankets?"

What I have learnt

You may write the following on the chalk board as a summary, or refer learners to page 56 of the Learner's Book to read.

10. Air is important in human life.
11. Air contains oxygen, nitrogen, carbon dioxide and other gases.
12. Oxygen in the air help in burning.
13. Without oxygen present in the air, fire will not be able to burn for us to use in cooking and other purposes.

Project for home or school

Refer learners to page 56 of the Learner's Book for this activity.

Task them to follow the steps below:

- Take a candle and fix it on a table. Light the candle. The candle will continue to burn due to continuous availability of fresh air providing the required oxygen for combustion.
- Now cover the burning candle by putting an inverted glass jar over it.

These should be the expected outcome

- After a short time, the candle stops burning and gets extinguished. When the burning candle is covered with the glass jar, then the candle takes away the oxygen necessary for burning from the air enclosed in the glass jar.
- After some time, when all the oxygen of air inside the glass jar is used up, then the burning candle goes off. This shows that air is necessary for combustion of substances.

Assessment for learning

Supervise learners to do the assessment tasks. Refer them to page 56 of the Learner's Book and pages 23 - 24 of the Workbook.

Answers to review exercises

Exercise 1

1. Activity to show that air supports burning.
 - i. Inverted glass
 - ii. blown out candle
 - iii. risen water.
2. Oxygen, water vapour, carbon dioxide and nitrogen

3.
 - Take a candle and place it in a tub,
 - Light the candle
 - Fill the tub with water.
 - The candle starts glowing after some time.
 - Now cover the candle with an inverted glass.
 - The candle blows out after burning for some time, and the water level inside the inverted glass rises to some extent.

Answers to workbook

Trial 1

- I. Take a candle and place it in a tub,
- II. light the candle
- III. fill the tub with water.
- IV. The candle starts glowing after some time.
- V. Now cover the candle with an inverted glass.
- VI. You will find that the candle blows out after burning for some time, and the water level inside the inverted glass rises to some extent.
- VII. The component oxygen of air inside the glass is used up in burning. Therefore, water occupies that space. This shows that air supports burning.

Trial 2

In this order:

- air
- oxygen
- burning
- quench
- fire

Trial 3

- a. Oxygen
- b. Carbon dioxide
- c. Water vapour
- d. nitrogen

Strand 2: CYCLES

Sub-strand 2: LIFE CYCLES OF ORGANISMS

LESSON 1: Conditions needed for plants to survive

LB: pages 57 - 62; WB: pages 25 - 26

CONTENT STANDARDS

B6.2.2.1 Demonstrate an understanding of the life cycle of a plant

INDICATOR

B6.2.2.1.1 Know the materials needed for the survival of plants in the environment (water, carbon dioxide, oxygen, sunlight)

LEARNING EXPECTATIONS

Learners will:

- ◆ Describe the effect of sunlight, water and air on the growth of plants
- ◆ Design an experiment to identify the conditions needed for plants to grow well

NEW WORDS

Survival, water, carbon dioxide, oxygen, sunlight, photosynthesis

RESOURCES

maize seed, water, seed pot, black soil.

CORE COMPETENCIES

Communication and Collaboration
Critical Thinking and Problem-Solving

SUBJECT SPECIFIC PRACTICES

Observing, Planning

HELPFUL LINKS

- ◆ <https://manoa.hawaii.edu/sealearning/grade-5/life-science/hydroponics>
- ◆ <https://www.youtube.com/watch?v=Nffg3GISuXg>

Without these conditions, plants will not grow well and they will not be able to produce food.

Starter

Ask the learners to mention some seed they know. Let them mention some conditions that help seed to germinate and grow.

Drill learners on the correct pronunciation of new words.

Teaching instructions

Activity 1

Plants require water to grow

- Divide the class into three groups. Give each group two potted plants and water
- Task each group to water one potted plant daily for five days and leave the other plant unwatered.
- Let them compare the two plants after one week and tell you what they observed. They will observe that the potted plant that was watered grows healthy and its leaves remain green. The plant which was not watered looks unhealthy and its leaves may begin to wither.

Activity 2

Sunlight helps plants to grow

- Let learners place one of the potted plants in a part of the school where it will be exposed to sunlight and place the other potted plant under a table in the classroom.
- Let them observe the plants daily for a week and report their findings. (They will observe that the potted plant that is exposed to the sun grows tall and healthy and its leaves remain green. The plant which was kept away from the sun becomes stunted and its leaves become brownish in colour).

Background information

The conditions needed for plant seeds to germinate includes water, air, sunlight and good seed. Sunlight helps plants to prepare their own food through the process of photosynthesis.

Talk about

Refer learners to the 'Talk about' question for discussion on page 60 of the Learner's Book. "Why it is not advisable to water your crops in the daytime when the sun is shining?"

What I have learnt

You may write the following on the chalk board as a summary, or refer learners to page 62 of the Learner's Book to read.

14. There are some conditions necessary for the proper growth of plants.
15. These are water, carbon dioxide, nutrients, sunlight and oxygen.

Project for home or school

Refer learners to pages 6 and 62 of the Learner's Book. Explain the activity to them before you give it out.

Assessment for learning

Supervise learners to do the assessment tasks. Refer them to pages 60 - 61 of the Learner's Book and pages 25 - 26 of the Workbook.

Answers to review exercises

Exercise 1

1. i. Water
Carbon dioxide
Oxygen
Sunlight
- ii. Water: helps plants to prepare their own food.
Carbon dioxide: helps plants to prepare food.
Oxygen: helps plants to undergo respiration.
Sunlight: gives plants energy to prepare their own food.

2. i. oxygen
ii. Water
iii. sunlight
iv. Carbon dioxide
3. i. c. roots
ii. b. food
iii. a. Photosynthesis
iv. d. leaves
v. b. oxygen

Answers to workbook

Trial 1

- a. Sunlight
- b. Water
- c. Oxygen
- d. Carbon dioxide

Trial 2

1. i. they cannot get energy to prepare their own food.
ii. they cannot be able to move nutrients from their roots to the other parts of the plant. They cannot prepare their own food.
iii. they cannot prepare their own food.
iv. they cannot undergo respiration to get energy.
2. In this order:
 - chlorophyll
 - sunlight
 - stomata
 - carbon dioxide
 - oxygen.

LESSON 2: Life cycle of plants

LB: pages 63 - 67; WB: pages 27 - 28

CONTENT STANDARDS

B6.2.2.1 Demonstrate an understanding of the life cycle of a plant

INDICATOR

B6.2.2.1.2 Observe the life cycle of a plant (okra or maize plant)

LEARNING EXPECTATIONS

Learners will:

- ◆ Explain the term life cycle of plants
- ◆ Describe the key stages in the life cycles of okro and maize plants
- ◆ Plant seeds of maize, okro and observe as they go through the various stages of the life cycle.

NEW WORDS

Okro, maize, germination, seedling

RESOURCES

Maize seed, water, seed pot, black soil.

CORE COMPETENCIES

Communication and Collaboration
Critical Thinking and Problem-Solving

SUBJECT SPECIFIC PRACTICES

Observing, Recording, Analysing
Planning, Designing, Manipulating
Measuring, Evaluating

HELPFUL LINKS

- ◆ <https://science4fun.info/life-cycle-of-plants/>
- ◆ https://www.youtube.com/watch?v=Wbfri_Yo5Tw

Background information

We were all born as babies. Babies grow to become young boys and girls. When boys and girls grow up, they become men and women. Men and women bring forth babies. Finally, men and women grow up to become old people.

Plants also grow through different stages. We will learn about some of the stages of growth of some of the common plants in our environment.

Life cycle of okro

- Okro is a flowering plant with edible green seed pods. It is a vegetable crop with slime when the seed pods are cooked.
- The scientific name of okro is *Abeimoscus Esculentus*.
- Okro is a fruit vegetable.
- It is a flowering plant with broad leaves.
- It bears yellowish flower at the nodes of the stem which develops into edible green seed pods.
- It is valued for its edible green pods. The seed of okro is not nursed. It is sown directly onto raised beds.
- The plant can produce for 10 to 12 weeks. it grows and bears seed pods.
- Start harvesting a few days after the okro blooms fade. At that point the seed pods should be soft and two to three inches long.

Life cycle of maize

- Maize is a cereal crop. It contains carbohydrates which are needed by both humans and animals for energy. Maize is used to prepare close to 50% of carbohydrate foods in Ghana. It is used to prepare banku, porridge, kenkey, tuo-zaafi among others. It grows well in loamy soil. Maize grows well directly on the field just like okro.
- The scientific name of maize is *zea mays*. We have maize varieties such as Laposta and Dobidi.
- The seeds germinate after about 6 to 9 days.
- After about 8 weeks the maize plant begins to develop tassels and silks. Tassels refers to the male part of the plant and the silk is the female part. The appearance of tassels show that the plant will produce maize grains.
- After an additional 3 weeks the maize fruits called kernels are ready for harvest.

Starter

Ask the learners to tell you what will happen when you. Let them mention some conditions that help seed to germinate and grow.

Teaching instructions

Activity 1

Planting of okro seed

- Divide the class into five groups. Give each group some seeds, water, bowl, and pot of loamy soil.
- Let each group soak the okro seed in water for 12 to 18 hours. This will soften the hard seed coat. (Let them know that soaking in water helps the seeds to germinate quickly).
- Let them plant the seed in the pot of loamy soil. Ask them to water the nurse seeds regularly.
- Let them tell you what will happen after about 6 days. (The seeds are expected to germinate).
- Task them to continue watering the plant regularly and observe what happens every week until the fourth week. (The plant is expected to begin producing flowers).
- Let them observe the plants for another two weeks and tell you what they see. (within two weeks after flowering, okro fruits begin to form on the plant)
- Give these additional information to learners (Refer them to pages 61-62 of the Learner's Book).

Activity 2

Planting maize seed

- In the previous groups, ask learners to prepare the garden.
- Let them dig a hole of about 4-5 cm deep and place 2 to 3 maize seed in the hole.
- Let them water the plants and observe what happens after 6 - 9 days. (The maize seed is expected to start germinating)
- Give these additional information to learners (Refer them to pages 64 - 65 of the Learner's Book)

Talk about

Engage learners to discuss the 'Talk about' question on page 65 of the Learner's Book. "Why maize plants are not grown on nursery beds before being transplanted".

What I have learnt

You may write the following on the chalk board as a summary, or refer learners to page 67 of the Learner's Book to read.

5. Flowering plants have a life cycle that involve germination of seeds, flowering and development of fruits.
6. Different plants have different days for germination and maturity of the crop.
7. On our own we can demonstrate the life cycle of common flowering plants in our community.

Project for home or school

Refer learners to page 65 of the Learner's Book. They are expected to print a report after the activity.

Assessment for learning

Supervise learners to do the assessment tasks. Refer them to pages 65 - 67 of the Learner's Book and page 27 - 28 of the Workbook.

Answers to review exercises

Exercise 1

1. i. A minimum of 2-3 seeds are placed in a hole 4-5cm deep.
ii. The seeds germinate after about 6 to 9 days.
iii. After about 8 weeks the maize plant begins to develop tassels and silks.
iv. After an additional 3 weeks the maize fruits called kernels are ready for harvest.
2. i. seed
ii. 6 days.
iii. When it begins to flower.
iv. 2 or 3 seeds.
v. green

Exercise 2

1. i. He should put the seeds in water before planting
ii. Because it can be cultivated at least twice within a year

- iii. It is planted on a nursery bed before being transplanted
- iv. They are both produced using seeds
- v. The maize plant does not produce any flowers.

Answers to workbook

Trial 1

1. a. the seeds germinate six days after planting.
- b. After about one month, the plant will begin to produce flowers.
- b. Within two weeks after flowering, pods or okro fruits begin to form on the plant.
- c. The pods can produce for 10 to 12 weeks. It grows and bears seed pods.

- d. The pods begin to fade after some few days.
 - e. At that point the seed pods should be soft and two to three inches long.
2. Learners to draw.

Trial 2

- i. seeds
- ii. 3 months
- iii. kernels
- iv. When it begins to flower
- v. pods

3

Strand:

Systems

Strand 3: SYSTEMS

Sub-strand I: THE HUMAN BODY SYSTEM

LESSON 1: Organs of the excretory system and their functions

LB: pages 70 - 75; WB: pages 30 - 32

CONTENT STANDARD:

B6.3.1.1 Recognise that different parts of the human body work interdependently to perform a specific function

INDICATOR:

B6.3.1.1.1 Explain the functions of organs in the excretory system of humans

LEARNING EXPECTATIONS

Learners will:

- ◆ Explain the need for urinating, breathing and sweating.
- ◆ Name and describe the organs of the excretory system and its products.
- ◆ List and describe the functions of the kidney, lungs, skin, and name their waste products.
- ◆ Mould the kidney and demonstrate how urine is produced.

NEW WORDS

Kidneys, Organs, Nephron, Excretory, Waste, Ureters, Muscular, Bladder, Hormones, Urine, Metabolism, Cholesterol, cortex, renal pelvis

RESOURCES

Videos, charts, and pictures of the excretory system, foam, transparent rubber tube (given set), empty carton box, pair of scissors, glue, colour pencils, balloons, empty plastic bottle, rubber, spray, and coloured straws (red and blue)

CORE COMPETENCIES

Communication and Collaboration, Personal Development and Leadership, and Creativity and Innovation.

SUBJECT SPECIFIC PRACTICES

Planning, Observing Communicating, recording, Analysing, and Evaluating.

HELPFUL LINKS

- ◆ <https://www.toppr.com/guides/biology/excretory-products/human-excretory-system/>
- ◆ <https://www.youtube.com/watch?v=TZMJJeZL-BVg>

Background information

Excretion is the process of disposing waste from the living organism. The excretory system of the human body is a collection of organs. These organs are responsible for the elimination of waste produced by the chemical processes in the body. They regulate the body's metabolism.

The excretory organ eliminates waste products such as urea, uric acid, ammonia, and other unwanted substances. Most of these waste substances and products are excreted from the body through urine. The process helps in maintaining the osmotic level of blood and plasma. The excretory system metabolizes or processes most medications and the drugs that are not processed in the liver.

The kidneys are the main organs of the human excretory system. Ureters come out of each kidney as an extension of the renal pelvis. The skin is responsible for the elimination of sweat. The liver is responsible for the elimination of bile. Kidney is responsible for the elimination of urine and urea and other nitrogenous waste. The lungs are responsible for the elimination of carbon dioxide.

Starter

Ask learners to tell you what happens before they urinate and what they see when they sweat.

Drill learners on the correct pronunciation and the meanings of the new words.

Teaching instructions

Activity 1

Supply learners with the things needed to make a model of the excretory system by grouping them into groups of six. Encourage learners to come out with their ideas in making models of the excretory system.

Ensure that learners use charts, pictures, and other sources to label the excretory system correctly. You can refer to the following youtube videos for ideas. <https://youtu.be/A5yyqFk20Jk>, https://youtu.be/Ba3Bj_Rrhr0

Things needed

- I. Foam
- II. Transparent rubber tube (Given set)
- III. Empty carton box
- IV. A pair of scissors
- V. Glue
- VI. Colour pencils
- VII. Balloons
- VIII. Empty place coca rubber
- IX. Spray
- X. Coloured Straws (red and blue)

Talk about

Refer learners to the 'Talk about' questions for discussion on page 72 of the Learner's Book.

What I have learnt

You may write the following on the chalk board as a summary, or refer learners to page 75 of the Learner's Book to read.

6. Every living organism generates waste in its body and has a mechanism to expel and get rid of this waste.
7. In humans, waste generation and disposal are taken care of by the human excretory system.
8. The parts of the human excretory system include the kidneys, skin, lungs and liver.
9. The excretory system removes waste such as urine, sweat and carbon dioxide.

Project for home or school

Refer learners to page 75 of the Learner's Book to do this activity.

These are possible responses.

- i. To enable the excretory organs to function well.
- ii. To enable the body to regulate its temperature and function very well.
- iii. To enable the body to become healthy.
- iv. To prevent an individual from becoming sick.

Assessment for learning

Supervise learners to do the assessment tasks. Refer them to pages 73 - 75 of the Learner's Book and pages 30 - 32 of the Workbook.

Answers to review exercises

Exercise 1

1. C
2. C
3. A
4. C
5. C
6. B
7. C
8. C
9. C

Exercise 2

1. Kidneys, Urethra, Ureters, Urinary Bladder, Skin, Liver, Lungs
2. i. Breathing in and out through the nose helps us take fuller, deeper breaths, which stimulates the lower lung to distribute greater amounts of oxygen throughout the body..... Here are a few more of the benefits of nasal breathing: The lungs extract oxygen from the air during exhalation, in addition to inhalation.
ii. The body produces urine (pee) as a way to get rid of waste and extra water that it does not need. Before leaving your body, urine travels through the urinary tract. The urinary tract is a pathway that includes the: kidneys: two bean-shaped organs that filter waste from the blood and produce urine.

- iii. Its main function is to control body temperature. As the water in the sweat evaporates the surface of the skin cools. An additional function of sweat is to help with gripping, by slightly moistening the palms.

3. a. For carrying urine.
b. To eliminate some amount of water in the form of vapour.
c. It receives urine from the ureters.
d. The skin helps in excretion. Humans sweat through the skin.

Exercise 3

k	n	o	o	u	r	i	y	e	m	u	r	e
i	t	n	l	r	s	e	e	n	i	e	l	k
e	n	e	p	h	r	o	n	i	h	s	i	e
a	b	r	h	c	a	m	d	t	s	l	s	r
n	i	l	l	u	k	s	i	s	r	t	u	d
a	a	b	m	a	r	r	k	e	f	a	r	i
a	n	l	b	i	g	e	s	i	i	v	e	s
i	t	o	l	s	l	v	v	n	n	g	m	h
g	o	o	a	e	g	e	n	i	u	r	u	l
k	t	d	d	a	t	n	e	u	l	u	h	l
u	b	o	d	e	s	a	u	o	a	t	m	e
s	n	i	e	r	b	c	p	l	s	r	i	a
b	m	u	r	e	l	n	e	e	i	n	b	i

Answers to workbook

Trial 1

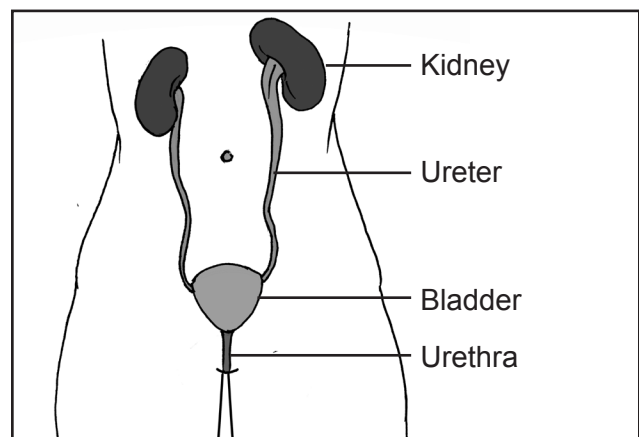
- b
- a
- a
- c
- a

Trial 2

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

Trial 3

- i. The human excretory system.
ii



Strand 3: SYSTEMS

Sub-strand 3: THE SOLAR SYSTEM

LESSON 1: The difference between a star, a planet and a satellite

LB: pages 76 - 86; WB: pages 33 - 35

CONTENT STANDARD

Show an understanding of the motion of bodies in the solar system

INDICATOR

B6.3.2.1.1: Explain the difference between a star, a planet and a satellite

LEARNING EXPECTATIONS

Learners will:

- ◆ Describe the relative positions of the objects in the solar system.
- ◆ Distinguish and classify the various bodies in the solar system.
- ◆ List the names of the planets in the solar system in their correct order.

NEW WORDS

Inner Planets, Outer Planets, Asteroid, Satellite, Hubble Telescope, Star, Galactic core, Milky Way, Gazing, Celestial bodies.

RESOURCES

Videos, chats, and pictures of the solar system, playdough, black polythene bag, carton boxes, colour pencils and toothpick.

CORE COMPETENCIES

Digital Literacy, Personal development and leadership, Communication and Collaboration

SUBJECT SPECIFIC PRACTICES

Observing, Analysing, Evaluating and Generalising.

HELPFUL LINKS

- ◆ <https://socratic.org/answers/235540>
- ◆ <https://byjus.com/physics/difference-between-stars-and-planets/>

Background information

Stars are heavenly bodies that produce their own light.

Planets on the other hand are smaller heavenly bodies that orbit or move around a star (Sun).

The moon is a satellite of the earth. Satellites are smaller bodies that move around bigger heavenly bodies called planets.

Starter

Let learners tell you the components of the solar system.

Drill learners on the correct pronunciation of the new words and their meanings.

Teaching instructions

Activity 1

- Put learners into groups of five. Give each group nine round cards with different sizes. Task each group to choose a leader. The leader writes Sun on the biggest card. Together with the other group members they write the names of the other planets and place them on the table face down.
- The leader should put the Sun in the centre of the table and ask the members to pick up one card at a time.
- Let them observe the names on the card and arrange them in their right order.

Activity 2

Learners are to do this activity at home.

- Refer to Learner's Book page 78 and guide learners on what is expected of them.
- They will draw the moon they saw and bring their drawings to class.

Activity 3

- Refer learners to page 79 of the Learner's Book.
- Instruct them to observe the picture of the solar system and answer the questions that follows.

Possible answers

GROUP WORK

1. Picture 1
2. Day, because I can play with my friends
3. Clouds

Activity 2

1. More than 50 stars
2. Yes
3. Yes, White, Yellow
4. North

Activity 3

1. Sun
2. About half the size of the sun
3. Jupiter
4. Mercury
5. 3rd Position
6. Sphere shapes, they are called planet
7. 2nd position
8. Jupiter
9. a) Left is Venus b) Right is Mars
10. a) Saturn b) Neptune
11. Neptune
12. Yes, because it is closer to the sun
13. a) Neptune b) Mercury
14. Earth

Talk about

Refer learners to the 'Talk about' question for discussion on page 84 of the Learner's Book. Accept many possible responses from learners.

- In our solar system, there is only one star that we know of – the Sun. Our solar system is very unique in that, it only has one star – the Sun.
- Yes, the Sun – in fact, our whole solar system – orbits around the center of the Milky Way Galaxy. We are moving at an average velocity of 828,000 km/hr. But even at that high rate, it still takes us about 230 million years to make one complete orbit around the Milky Way!

What I have learnt

You may write the following on the chalk board as a summary, or refer learners to page 86 of the Learner's Book to read.

10. A planet is a body that moves around a star. e.g. is the moon.

11. A satellite is a body that revolves around a **planet**.

12. A star is a body that revolves around a **galactic core**, which in some cases (such as the **Milky Way**) is a black hole.

Project for home or school

Refer learners to page 84 of the Learner's book for the home project.

Assessment for learning

Supervise learners to do the assessment tasks. Refer them to page 83 of the Learner's Book and page 33 - 35 of the Workbook.

Answers to review exercises

Exercise 1

13. 3651/4
14. Year
15. Revolution
16. Asteroids
17. The gravity of the Sun keeps them in their orbits.
18. Revolution
19. A falling star
20. Ellipse
21. Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune

Exercise 2

- i. Satellite refers to a machine that is launched into space and moves around Earth or another body in space OR A smaller body that orbits a bigger body in space.
- ii. A planet is a large object such that orbits a star. Objects that orbit planets are called satellites. A star and everything which orbits it are called a solar system. There are eight planets in our Solar System.
- iii. The solar system is made up of the sun and everything that orbits around it, including planets, moons, asteroids, comets, and meteoroids.

Answers to workbook

Trial 1

1. i. A ii. A
2. Satellite refers to a machine that is launched into space and moves around Earth or another body in space OR A smaller body that orbits a bigger body in space.
3. Electric bulb, lantern, flashlight, candle.

Trial 2

1

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

- 2 i. Bottle, ii. Hat, iii. Ran, iv. Plan, v. Toast
These words are highlighted in the puzzle.

Strand 3: SYSTEMS

Sub-strand 3: ECOSYSTEM

LESSON 1: Interactions in an ecosystem and the effect on humans

LB: pages 87 - 94; WB: pages 36 - 39

CONTENT STANDARD

B6.3.3.1 Show an understanding of, the interdependency of organisms in an ecosystem and appreciate the interactions

INDICATOR

B6.3.3.1.1 Investigate various interactions in an ecosystem and the effect on humans

LEARNING EXPECTATIONS

Learners will:

- ♦ Identify and write the names of different ecosystems and the organisms found in the system.
- ♦ Give the names of some different forms of interactions that occurs between organisms in an ecosystems.
- ♦ Discuss some of the effects of human activities, farming, predation, mining (galamsey), pollution have within a given ecosystem.

NEW WORDS

Evaporates, Ecosystem, Hydrological, Parasitism, Condenses, Bacteria

RESOURCES

Videos, chats, and pictures of different ecosystems, black soil, transparent container, seedlings of tomato and maize, water, snail, and earthworm, improvised aquarium.

CORE COMPETENCIES

Critical Thinking and Problem-Solving, Communication and Collaboration, and Personal Development and Leadership.

SUBJECT SPECIFIC PRACTICES

Designing, Planning, Observing, and Analysing.

HELPFUL LINKS

- ♦ <https://www.khanacademy.org/science/high-school-biology/hs-ecology/hs-ecological-relationships/a/ecological-interactions>

Background information

An ecosystem is an interaction between living and non-living things in a particular place or environment. The interaction occurs in a place such as forest. All organisms and plants within this place are interacting all the time and adjustments must occur if the organism needs to survive.

Human impact on the environment includes changes to the biophysical environment and ecosystem, biodiversity and natural resources cause directly or indirectly by humans including galamsey, warming, environmental degradation (ocean acidification), mass extinction and biodiversity loss, ecological crisis, and ecological collapse.

Some human activities that cause damage directly or indirectly to the environment on a global scale include human reproduction, over consumption, over exploration, pollution, and deforestation to name but a few.

Starter

Ask learners to name some things that can be seen in the forest.

Drill learners on the correct pronunciation of the new words and their meanings.

Teaching instructions

Activity 1

- Put learners into groups of five. Give each group the following materials: plates, bird seeds and berries.

- Ask each group to put some bird seeds in one plate and berries into the other plate. Let them put the plates with the items on the school compound where birds can see.
- Task each group to go closer to the plate every 5 minutes until 30 minutes and observe what happens.

Observation

It will be observed that majority of the birds will feed on the bird seeds more than the berries.

Let learners know that birds prefer dry seeds than succulent fruit such as berries.

Talk about

Refer learners to the 'Talk about' questions for discussion on page 90 of the Learner's Book.

Possible responses:

1. Plants and animals depend upon each other as mutual interdependence. This is a must for their survival. Plants provide shelter for animals and they make oxygen for the animals to live. When animals die they decompose and become natural fertilizer plants. Plants depend on animals for nutrients, pollination, and seed dispersal.
2. A series of organisms through which food energy flows in an ecosystem is called a food chain.

It may also be defined as follows. A series of organisms in which each organism feeds on the one below it in the series.

What I have learnt

You may write the following on the chalk board as a summary, or refer learners to page 92 of the Learner's Book to read.

22. An ecosystem includes all of the living things (plants, animals and organisms) in a given area, interacting with each other, and also with their non-living things in the environment (weather, earth, sun, soil, climate, and atmosphere).
23. Ecosystems often contain many living things and can be as small as your backyard or as large as the ocean.
24. All organisms have needs, such as food, water, and air. If the needs of the organisms

in a place, the ecosystem, are not met the organisms there cannot survive.

25. There are many examples and different types of ecosystems.
26. Flowers in a garden provide nectar for birds, bees and other insects.
27. Birds and insects transfer pollen between plants, helping the plants reproduce and survive.
28. Trees provide shelter and nesting areas for animals like squirrels.
29. Small puddles in gardens are ecosystems! They contain algae, worms and insects.

Project for home or school

Refer learners to page 92 of the Learner's Book for their home project.

Assessment for learning

Supervise learners to do the assessment tasks. Refer them to pages 91 - 92 of the Learner's Book and pages 36 - 39 of the Workbook.

Answers to review exercises

Exercise 1

1. TRUE
2. TRUE
3. TRUE
4. FALSE

Exercise 2

- a. Symbiosis is any type of close and long-term biological interaction between two different biological organisms, be it mutualistic, communalistic, or parasitic. The organisms, each termed a symbiotic, may be of the same or different species.
- b. Parasitism is a relationship between species, where one organism, the parasite, lives on or in another organism, the host, causing it some harm, and is adapted structurally to this way of life.
- c. Mutualism describes the ecological interaction between two or more species where each species has a net benefit. Mutualism is a common type of ecological interaction.

Exercise 3

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

Answers to workbook

Trial 1

- 1. c
- 2. d
- 3. b
- 4. c
- 5. e
- 6. b
- 7. b
- 8. b

Trial 2
1.

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

2. a. FOOD b. WEB c. TRAP d. PLATE e. LATE f. EAR

These words are highlighted in the puzzle.

4

Strand:

Forces and energy

Strand 4: FORCES AND ENERGY

Sub-strand I: SOURCES AND FORMS OF ENERGY

LESSON 1: Renewable and non-renewable sources of energy

LB: pages 94 - 97; WB: pages 42 - 44

CONTENT STANDARD

B6.4.1.1 Demonstrate understanding of the concept of energy, its various forms and sources and the ways in which it can be transformed and conserved

INDICATOR

B6.4.1.1.1 Compare renewable and non-renewable sources of energy

LEARNING EXPECTATIONS

Learners will:

- ♦ Describe the sun as the ultimate source of energy on earth.
- ♦ Identify and name some sources of energy humans use.
- ♦ Classify the energy sources as renewable and non renewable
- ♦ Identify and name some different forms of energy.
- ♦ Explain the terms renewable and non-renewable sources of energy.

NEW WORDS

Renewable, non-renewable, thermal, hydroelectric, deplete.

RESOURCES

A video, chart or pictures showing various sources of energy.

CORE COMPETENCIES

Critical thinking and Problem-Solving
Communication and Collaboration

SUBJECT SPECIFIC PRACTICES

Planning, Observing, Analysing
Synthesising, Generating

HELPFUL LINKS

<https://www.youtube.com/watch?v=PLBK1ux5b7U>

Background information

Energy is the capacity to do work. It is very important in human lives because without it many life activities won't be able to happen. There are many sources of energy such as sun, wind, firewood, batteries, water and these can be grouped into renewable and non-renewable sources of energy.

Those sources of energy that gets depleted after usage are known as non-renewable and those that do not get depleted after usage is known as renewable source of energy.

Starter

Engage learners in an activity that involves less usage of energy such as jumping, singing or walking.

Drill learners on the correct pronunciation and the meanings of the new words.

Teaching instructions

Activity 1

- Ask learners this question. What is energy? Give examples. (Answers to this question may include the sun, batteries, firewood and hydroelectric power and thermal plants).

Activity 2

- Show pictures and videos of different sources of energy such as batteries, food and water to learners.
- Have learners work in groups of six to identify sources of energy and sort them into:
 - a. Sources that are not depleted when used (solar, wind and hydro sources)
 - b. Sources that are depleted after use (e.g. fire wood, batteries, food, gasoline, diesel, kerosene etc.)
- Ask learners to present their responses on flashcards for general discussion in class.

Activity 3

- Assist learners to build their vocabulary by introducing and explaining the terms “renewable” and “non-renewable” sources of energy and give examples of such sources.

Activity 4

- Refer learners to Activity 1 and 2 on page 96 of the Learner’s Book.
- Guide them to carry out the activities or the construction of the word vane and elastic moving pool.

Talk about

Refer learners to talk about questions for discussion on page 96 of the Learner’s Book.

“How does energy help living things in their daily activities?”

“How do some sources of energy such as charcoal, kerosene, petrol affect living things in a negative way?”

What I have learnt

You may write the following on the chalk board as a summary, or refer learners to page 97 of the Learner’s Book to read.

1. Energy is the capacity to do work.
2. Renewable sources of energy can be regained after use. Example water, sun and wind.
3. Non-renewable source of energy cannot be re-gained after use. It gets finished, used up, and fresh ones must be procured. Example dry cells, coal, natural gas and crude oil.

Project for home or school

Explain to learners how to go about the project and stress on neat, correct and orderly presentation of work.

Assessment for learning

Supervise learners to do the assessment tasks. Refer them to page 95 of the Learner’s Book and pages 42 - 44 of the Workbook.

Answers review exercise

Exercise 1

1. Solar and nuclear.
2. nuclear energy, fossil energy -- like oil, coal and natural gas -- and renewable sources like wind, solar, geothermal and hydropower.
3. Hydropower, solar, wind, tidal, geothermal energy from inside the earth, biomass from plants, and nuclear fusion. [Any 2]
4. Petrol, coal, nuclear energy, natural gas [Any 2]

Answers to Workbook

Trial 1

- 1 b. Charcoal
- 2 a. Kinetic
- 3 b. Renewable

Trial 2

Renewable: Pictures A, C and E.
Non-renewable: Pictures B, D and F.

Trial 3

Renewable: solar energy, wind energy, hydropower, geothermal energy, and biomass energy.

Non-renewable: such as coal, oil, and natural gas.

LESSON 2: Measuring temperature using thermometer

LB: pages 98 - 100; WB: pages 45 - 46

CONTENT STANDARD

B6.4.1.2 Show understanding of the concept of heat energy in terms of its importance, effects, sources and transfer for one medium to another.

INDICATOR

B6.4.1.2.1 Measure the temperature of a body using a thermometer.

LEARNING EXPECTATIONS

Learners will:

- ♦ Describe the various types of thermometer.
- ♦ Demonstrate how to measure body temperature using a clinical thermometer.

NEW WORDS:

Laboratory, Clinical

RESOURCES:

Various types of thermometers, clinical, laboratory, digital, plastic bottles, straws, dyes, water.

CORE COMPETENCIES

Critical thinking and Problem-Solving
Communication and Collaboration
Personal development and leadership

SUBJECT SPECIFIC PRACTICES

Planning, Observing, Recording
Measuring, Generating

HELPFUL LINKS

- ♦ <https://www.youtube.com/watch?v=J157oziu3zQ>

called thermometer. The result could be recorded in degree Celsius ($^{\circ}\text{C}$) or degrees Fahrenheit ($^{\circ}\text{F}$). Clinical, analogue or laboratory thermometers are some types of thermometers available.

Starter

Display teaching resources before learners. Let them feel the thermometers and in groups of desired number. Let learners talk about what they see.

Drill learners on the correct pronunciation and meanings of the new words.

Teaching instructions

Activity 1

- Assist learners to reflect on their previous knowledge on heat and temperature. (Temperature refers to the degree of hotness or coldness of a body).
- Provide clinical and laboratory thermometers or show pictures of types of thermometers.
- Let learners identify the equipments and tell you where and when they are used.

Activity 2

- Take a learner's body temperature and record it. Let the learner run about 400 meters and take the temperature again.
- Compare the two records and note any difference.

Activity 3

- Guide learners in groups of four to produce their own improvised thermometers using plastic bottles, plastic straws, dyes and water.

Talk about

Refer learners to the 'Talk about' questions on page 100 of the Learner's Book for discussion.

"What kind of liquids can be seen in thermometers?"

"How does the liquids in thermometers help us to read body temperature?"

Background information

Temperature is the degree of hotness of a body. It is very important to measure the temperature of substances including the body of human beings. This helps to show the quality level of the substance of the body under consideration. Temperature can be measured using a device

What I have learnt

You may write the following on the chalk board as a summary, or refer learners to page 100 of the Learner's Book to read.

5. Guide learners to recall the lesson taught by asking them questions.
6. Give a summary of the lesson by listing out critical points.

Project for home or school

Refers learners to page 100 of the Learner's Book to do the project. Explain to learners what is expected of them.

Assesement for learning

Supervise learners to do the assessment tasks. Refer them to page 100 of the Learner's Book and pages 45 - 46 of the Workbook.

Answers review exercise

Exercise 1

1. Degree Celsius [$^{\circ}\text{C}$] and the Kelvin [K]
2. The degree of coldness or hotness of a body
3. A medical thermometer (also called clinical thermometer) is used for measuring human or animal body temperature.

4. Digital thermometers
Electronic ear thermometers. ...
Forehead thermometers. ... Plastic strip thermometers. ...
Pacifier thermometer. ...
Glass and mercury thermometers.
5. Mercury. Other liquids, such as kerosene or ethanol, may also be used in these types of thermometers.

Answers to Workbook

Trial 1

- 1 c. 100°C
- 2 b. Mercury
- 3 Degree of hotness of a body
- 4 It wet glass

Trial 2

Accept appropriate drawing.

Strand 4: FORCES AND ENERGY

Sub-strand 2: ELECTRICITY AND ELECTRONICS

LESSON 1: Electric circuits

LB: pages 101 - 104; WB: pages 47 - 48

CONTENT STANDARD

B6.4.2.1 Demonstrate knowledge of electricity, its transmission and transformation into other forms.

INDICATOR

B6.4.2.1.1 Construct an electric circuit and know the function of its components.

LEARNING EXPECTATIONS

Learners will:

- ◆ Construct an electric circuit.
- ◆ Describe the functions of the various electric circuit components.

NEW WORDS

Circuit, Cell, Construct,

RESOURCES

Dry cell, bulb, connecting wires, switch, video on basic electronic circuit.

CORE COMPETENCIES

Critical thinking and Problem-Solving
Communication and Collaboration

SUBJECT SPECIFIC PRACTICES

Planning, Observing, Manipulating,
Generating

HELPFUL LINKS

- ◆ <http://www.learnhive.net/learn/cbse-grade-6/science/electricity-and-circuits>
- ◆ <https://www.youtube.com/watch?v=js7Q-r7G9ug>

Electric circuit can be described as a unit.

When electric circuit is closed, current flows to the load to make it work. For instance to light a bulb. Anytime the circuit is opened, current will not flow, hence the bulb in the circuit will not produce light.

Starter

Display electric circuit components before learners to have a feel of the components and also to learn their names.

Drill learners on the correct pronunciation and the meanings of the new words.

Teaching instructions

Activity 1

- Show a video on basic electronic circuit. Engage learners in groups of four to discuss the basic component of an electronic circuit.

Activity 2

- Provide learners with the electrical components and assist them to construct a functional simple electric circuit.
- Engage learners to draw the circuit they have constructed. Refer them to page 103 of the Learner's Book.

Activity 3

- Show pictures of the components of electric circuit to learners. Let them tell you their functions.

Talk about

Refer learners to talk about questions on page 104 of the Learner's Book for discussion.

"Why are electrical circuits important?"

"What happens when you add a buzzer to your circuit?"

Background information

Electric circuit is a path that allows the flow of electric energy. The current can then help the electric components or devices to work. These components may include connecting wires, a source of power –battery, switch/key and a load e.g. bulb.

What I have learnt

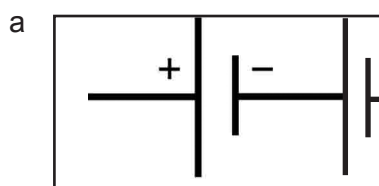
Summarize lesson to learners by listing and touching on salient points. You can refer them to page 104 of the Learner's Book to read the points.

Assessment for learning

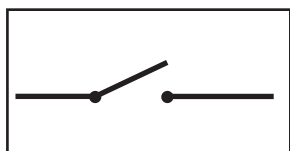
Supervise learners to do the assessment tasks. Refer them to page 104 of the Learner's Book and pages 47 - 48 of the Workbook.

Answers review exercise

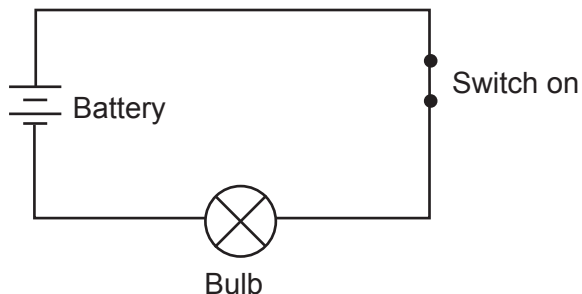
1



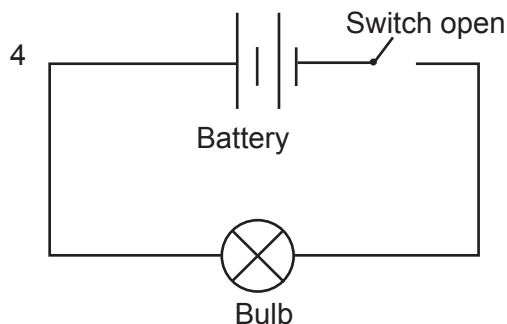
b



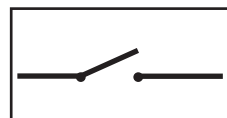
2



3. a. Naked (bare) wires
- b. Insulated wires



5. Switch



Answers to workbook

Trial 1

1. i) A - Battery
B - Switch
C - Light bulb
- ii) The light bulb comes on
- iii) Chemical energy
- iv) Open circuit
2. a. accept appropriate diagram
- b. accept appropriate diagram
3. a) It converts chemical energy to electrical energy.
- b) Used to switch on and off the circuit.
- c) They allow flow of electricity. Serves as pathway for electricity.
4. breaks.
5. gap

LESSON 2: Symbols used in circuit diagrams

LB: pages 105 - 108; WB: pages 49 - 52

CONTENT STANDARD

B6.4.2.1 Demonstrate knowledge of generation of electricity, its transmission and transformation into other forms.

INDICATOR

B6.4.2.1.2 Identify the symbols used in representing various components in a given circuit diagram.

LEARNING EXPECTATIONS

Learners will:

- Describe and identify electric symbols with their names.
- Recognise and name some given electric symbols.

NEW WORDS

Symbol, Circuit, Component

RESOURCES:

A picture or samples and charts displaying the various electric symbols and components, or a video if any.

CORE COMPETENCIES

Critical thinking and Problem-Solving
Communication and Collaboration

SUBJECT SPECIFIC PRACTICES

Planning, Observing
Manipulating, Generating

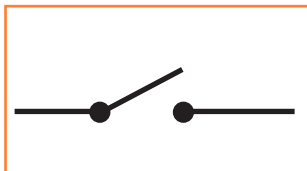
HELPFUL LINKS

- <https://www.youtube.com/watch?v=VIR9dhlcTp0>
- <https://www.slideshare.net/YoshyFaweta/electric-circuit-email2>

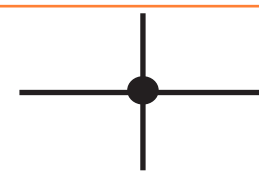
Background information

Circuit diagrams use symbols to represent the components in a set-up. Components such as switch/key, connecting wires, battery, and electrical bulb are represented by symbols. They are all described as electric components.

Components and their symbols



switch circuit



connected wire



battery circuit



bulb circuit

Starter

Begin by guiding learners to recall previous knowledge on electric circuit. Let them name some components in an electric circuit.

Drill learners on the correct pronunciation and the meanings of the new words.

Teaching instructions

Activity 1

- Put learners into groups of six. Give each group pictures of the components of an electric circuit and their symbols.
- Let them identify and match basic components of an electric circuit with their symbols.

Activity 2

- In groups of four, let learners draw simple circuit diagrams using symbols of the components (switch, connecting wires, battery, electrical bulb).

Activity 3

- Reflect with learners on the circuit diagrams they have drawn. Engage them in a discussion on the use of the components.

Talk about

Refer learners to the 'Talk about' questions for discussion on page 106 of the Learner's Book.

"Why do we need components to form a circuit?"

"How will you describe an open circuit?"

What I have learnt

You may write the following on the chalk board as a summary, or refer learners to page 108 of the Learner's Book to read.

5. Circuit symbols are used in place of pictures of the actual components.
6. The symbols are used in drawing circuit diagrams.
7. A circuit diagram shows a battery, connecting wire, switch and a load.

Project for home or school

Explain home learning activity to learners by referring them to page 108 of the Learner's Book.

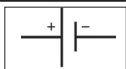
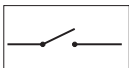
Assessment for learning

Supervise learners to do the assessment tasks. Refer them to pages 104 - 105 of the Learner's Book and pages 49 - 52 of the Workbook.

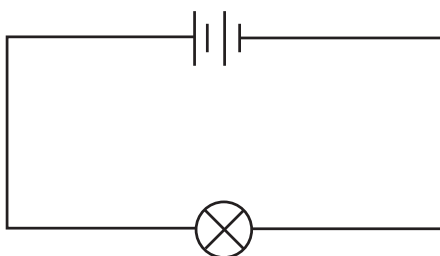
Answers to review exercise

Exercise 1

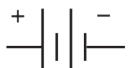
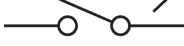
1.

Component	Name
	Battery
	Switch

2

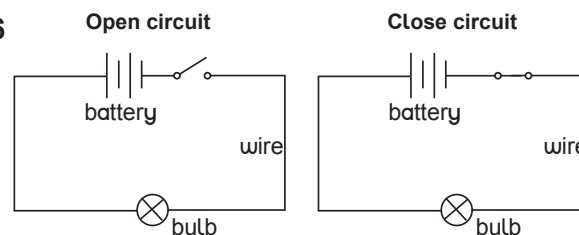


3

Picture	Name
	switch
	Connecting wires
	Battery

4. An electric circuit in which the continuity is broken so that current does not flow.
5. Closed circuit means a complete electrical connection around which current flows or circulates. When you have a series of electrical wires connecting to each other and completing a circuit so that current travels from one end of the circle to the other, this is an example of a closed circuit.

6

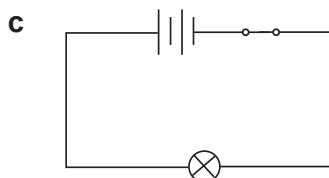


Answers to Workbook

Trial 1

1. They are used to switch on and off the circuit, allow the flow or stop the flow of electrical energy.

2. a. Electric circuit
b. Close circuit



Trial 2

Picture	Nome
i 	Dry cell
ii 	Connecting wires
iii 	Bulb

Trial 3

A - Dry cells

B - Switch

C - Bulb

Trial 4

1. i. B

ii. Accept appropriate diagram.

LESSON 3: Conductors, semi-conductors and insulators.

LB: pages 109 - 113; WB: pages 53 - 55

CONTENT STANDARD

B6.4.2.1 Demonstrate knowledge of generation of electricity, its transmission and transformation into other form.

INDICATOR

B6.4.2.1.3 Know conductors, semi-conductors and insulators.

LEARNING EXPECTATIONS

Learners will:

- Describe what conductors, Semi-Conductors and insulators are.
- Name some materials that are conductors, Semi-Conductors and insulators.

NEW WORDS

Conductors, Insulators, Semi-conductors, Diodes, LEDs

RESOURCES

Wood, bulb, plastics, wires, metals, etc.

CORE COMPETENCIES

Critical thinking and Problem-Solving
Communication and Collaboration

SUBJECT SPECIFIC PRACTICES

Planning, Observing
Manipulating, Generating

HELPFUL LINKS

- <https://youtu.be/Qh48fJZBiYk>

Background information

Conductors are materials that easily allow electrical energy to move through them. Conductors have free electrons. Some common conductors are copper, aluminium, gold, iron, etc. Insulators do not allow electrical energy to go through them. They make poor conductors. Examples are glass, air, plastic, rubber and wood.

Semi-conductors are materials whose conductivity is between that of a conductor and insulators. Some materials because of temperature effects or addition of impurities can have some conductivity. These are called semiconductors. They are used as transistors, diodes, and LEDs. Silicon and germanium are commonly used as semiconductors.

Starter

Display learning materials before learners to mention or identify their names and have a feel of them. E.g. Glass, iron, transistor, LEDs, copper, etc.

Drill learners on the correct pronunciation and meanings of the new words.

Teaching instructions

Activity 1

- Put learners into groups of five and provide them with the following materials (spoons, foils, drinking, plastic materials, pieces of wood, glass rod, leather, nails, keys, pencils, LEDs, pen diodes, etc).
- Guide them to build or construct a simple electric circuit (an open circuit) using a bulb, battery and connecting wire.

Activity 2

- Brainstorm with learners on the meaning of the terms. "conductors" "semi-conductors" and "insulators" with examples.

Activity 3

- Direct learners to use the open circuit to classify the materials provided as conductors, semi-conductors and insulators.
- Ask learners to explain why the electrical wires and gadgets in their homes are coated with plastics.

Talk about

Refer learners to talk about questions for discussion on page 111 of the Learner's Book. "The difference between conductor and semi-conductor".

“Why electrical wires in your homes are coated with plastics”.

What I have learnt

Assist learners to recall what they have learnt about the lesson by reading the summary points on page 113 under what I have learnt.

Project for home or school

Encourage learners to do their home activity on page 112 of the Learner’s Book. Let them present their work in class for discussion.

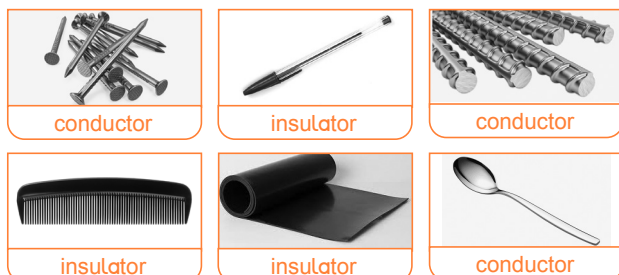
Assessment for learning

Supervise learners to do the assessment tasks. Refer them to page 112 of the Learner’s Book and pages 53 - 55 of the Workbook.

Answers to review exercise

1. a) An electrical conductor is a substance in which electrical charge carriers, usually electrons, move easily from atom to atom with the application of voltage. Conductivity, in general, is the capacity to transmit something, such as electricity or heat. Copper, steel, gold, aluminum, and brass are also good conductors.
 - b) A semiconductor is a substance that can conduct some electricity.
 - c) An insulator is a material that does not conduct electrical current.
2. Most electrical wire is covered in a rubber or plastic coating called insulation. The purpose of insulation covering the metal part of an electrical wire is to prevent accidental contact with other conductors of electricity, which might result in an unintentional electric current through those other conductors.

3



4. silicon, germanium, gallium arsenide

5. metals, electrolytes

Answers to workbook

Trial 1

Conductors	Semi-conductors	Insulators
Keys	Diodes	Wood
Nail	LEDs	Leather
Metal rod		Plastics
		Ruler

Trial 2

1. Plastic.
2. They do not conduct heat.
3. Insulators
- 4.

Conductors	Insulators
They conduct heat	They do not conduct heat.
Mostly made of metals	Mostly made of plastics and wood.

Trial 3

1. Basis electronic component.
2. A → semi-conductor.
B → conductor
C → insulator

LESSON 4: Electronic circuit

LB: pages 114 - 118; WB: pages 56 - 58

CONTENT STANDARD

B6.4.2.2 Know the functions and assemblage of basic electronic components.

INDICATOR

B6.4.2.2.1 Construct an electronic circuit using battery, connecting wire and LED.

LEARNING EXPECTATIONS

Learners will:

- ♦ Construct an electronic circuit.
- ♦ Draw and label an electronic circuit.

NEW WORDS

Electronic, Series, Connecting.

RESOURCES

Battery, connecting wires, LED

CORE COMPETENCIES

Critical thinking and Problem-Solving
Communication and Collaboration

SUBJECT SPECIFIC PRACTICES

Planning, Observing, Manipulating
Evaluating, Communicating
Generating

HELPFUL LINKS

- ♦ <https://www.dummies.com/programming/electronics/components/what-is-an-electronic-circuit/>

Background Information

Electronic circuit using battery, connecting wire and LED will make the LED light up due to how the connection will be done. To make the LED light up, always connect the positive terminal of the battery to the positive lead of the LED and the negative terminal of the battery to the negative lead of the LED. Positive Lead of LED is P-type and negative Lead of LED is N-type.

These components are found in flashlights, radios, computers, mobile phones, television sets, remote control, etc.

Starter

Assist learners to revise or recall previous knowledge on electric circuit.

Drill learners on the correct pronunciation and meanings of the new words.

Teaching instructions

Activity 1

- Put learners into groups of four and provide them with connecting wires, LEDs, switches/keys and batteries.
- Guide learners in their groups to connect a series circuit comprising of LED, 3V battery and a switch to light the LED.

Activity 2

- In their previous groups, learners are tasked to draw the electronic circuit and label the parts.

Activity 3

- Engage learners to discuss what they did to light the LED to the whole class.

Talk about

Refer learners to talk about questions for discussion on page 116 of the Learner's Book

What I have learnt

Using questions, help learners to summarize lesson by reading the summary text in the Learner's Book on page 118.

Project for home or school

Give home learning task to learners to make room for more understanding. Explain task to learners to serve as a guide to them so they don't deviate from what is expected of them. Collect, mark and give feedback to learners.

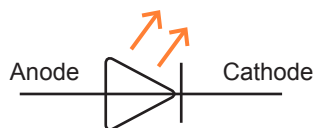
Assessment for learning

Supervise learners to do the assessment tasks. Refer them to page 118 of the Learner's Book and pages 56 - 58 of the Workbook.

Answers to review exercises

Exercise 1

1. a.



b.



2. In simplest terms, a light-emitting diode (LED) is a semi-conductor device that emits light when an electric current is passed through it while a fluorescent lamp, or fluorescent tube, is a low-pressure mercury-vapour gas-discharge lamp that uses fluorescence to produce visible light.
3. Materials made of metal are common electrical conductors.
4. They are mostly used for carrying current. They create the path through which the electrical energy goes around.

5. a. Different colours of wires allows easy tracing of where they come from and go in a circuit.
b. Red, black, brown, blue and white.

Answers to workbook

Trial 1

- | | |
|-------------|-------------|
| i. LED | ii. Battery |
| iii. Switch | iv. Wire |

Trial 2

1. P-type and N-type.
2. Primary batteries cannot be recharged. Secondary batteries can be recharged.
3. When the battery runs down and unable to produce power.

Trial 3

- | | |
|-------------------------|--------|
| 1. i. a. Battery | b. Key |
| c. connecting wire | d. LED |
| ii. The LED will light. | |
| iii. Open circuit. | |

Strand 4: FORCES AND ENERGY

Sub-strand 3: FORCES AND MOVEMENT

LESSON 1: Relationship between energy and forces

LB: pages 119 - 121; WB: pages 59 - 60

CONTENT STANDARD

B6.4.3.1 Know that movement is caused by applied forces due to the release of stored energy.

INDICATOR

B6.4.3.1.1 Recognize the relationship between energy and forces

LEARNING EXPECTATIONS

Learners will:

- ◆ Explain what Energy, work, mass and Force are.
- ◆ Explain the relationship between energy and forces

NEW WORDS

Exerted, work done.

RESOURCES

Books, stone, chair, table, etc.

CORE COMPETENCIES

Critical thinking and Problem-Solving
Communication and Collaboration

SUBJECT SPECIFIC PRACTICES

Planning, Observing, Manipulating
Evaluating, Communicating
Generating

HELPFUL LINKS

- ◆ <https://youtu.be/WSY4HzWZllo>

The greater the force exerted on a body (the greater mass a body has) or on a machine the greater the work done.

Also, the greater the distance moved by a force on a body or on a machine the greater the work done. Daily activities need energy to make the activities happen.

Starter

Find out from learners their general understanding of forces and energy through effective questioning and positive feedback.

Drill learners on the correct pronunciation and meanings of the new words.

Teaching instructions

Activity 1

In groups of five:

- Ask learners to brainstorm on the relationship between energy and force. E.g. Why is it more difficult to lift a table than a book?

Activity 2

In their previous groups:

- Lead learners to explain that when a force acts on an object, it first needs to overcome the mass (weight) of the object before it can make the object move in the direction of the force. Thus, it is easier to pull a lighter object than a heavier one.

Activity 3

- Using think-pair-share strategy ask learners to explain force and energy.
- Let them share their ideas in class for discussion.

Talk about

Refer learners to talk about questions for discussion on page 120 of the Learner's Book.

Background information

Energy is the ability to do work. Work is done when a force moves an object in the direction of the force. Energy is measured in joules (J). Force is the push or pull which changes the state of objects.

What I have learnt

Assist learners to recall lesson taught.
Use questions to find out learners understanding of the lesson to improve critical thinking and problem solving.

You can also refer them to page 121 of the Learner's Book to read.

Project for home or school

Refer learners to page 121 of the Learner's Book to answer the questions. Assemble work for class discussions.

Assessment for learning

Supervise learners to do the assessment tasks.
Refer them to page 120 of the Learner's Book and pages 59 - 60 of the Workbook.

Answers to Review Exercise:

1. a. Newton b. Joules
2. Pressure
3. Force is push or a pull of an object whiles energy is ability to do work. Force is measured in joules whiles energy is measure in Newtons.

Answers to Workbook

Trial 1

1. a force is any interaction that, when unopposed, will change the motion of an object.
- b. the strength and vitality required for sustained physical or mental activity.
2. a. joule (J)
b. Newton
3. heat or sound.

Trial 2

1. When a force is exerted on a body, it can cause the object to experience a change in position or shape.
2. 200m race will use more energy because the distance is longer than the 100m race.

LESSON 2: Classes of simple machines

LB: pages 122 - 125; WB: pages 61 - 63

CONTENT STANDARD

B6.4.3.2 Recognize some simple machines used for making work easier, analyze their advantages and know their uses.

INDICATOR

B6.4.3.2.1 Identify levers, pulleys, inclined planes as classes of simple machine and cite some common examples.

LEARNING EXPECTATIONS

Learners will:

- ◆ Explain what machines, load and effort of machines are.
- ◆ Describe the proper ways of using machines.
- ◆ Identify the classes of simple machines
- ◆ Describe the load and the effort of a simple machine.

NEW WORDS

Lever, Inclined planes, pulleys.

RESOURCES:

Simple machines such as pliers, scissors, hammer, axe, screw driver, bamboo, wood, cardboard, plastic, paper and straw.

CORE COMPETENCIES

Critical thinking and Problem-Solving
Communication and Collaboration

SUBJECT SPECIFIC PRACTICES

planning, observing, manipulating,

HELPFUL LINKS

- ◆ <https://www.youtube.com/watch?v=y0paquTQvEU>
- ◆ <http://www.learnhive.net/learn/icse-grade-6/physics/simple-machines>

Levers are also simple machines that are classified as 1st class, 2nd class and 3rd class levers. The shovel, cutlass, hatchet, hoe, crowbar, claw hammer, wooden board are all examples of simple machines.

Starter

Display learning resources before learners. They should identify them and tell their uses.

Drill learners on the correct pronunciation and meanings of the new words.

Teaching Instructions

Activity 1

- Lead learners to visit various work places and workshops where levers, pulleys, or inclined planes are in use. Or show pictures of such places and shops that show different types of simple machines and various classes of levers.
- Learners talk about their experiences on the visit.

Activity 2

- Show learners examples of simple machines like screw drivers, pliers, scissors, wheelbarrow, hammers, screws, wooden board, etc.
- Demonstrate how they are used and identify and classify them as levers, pulleys or inclined planes.
- Guide learners to demonstrate the proper ways of using simple machines.

Activity 3

- In groups of four, ask learners to design and make simple machines of their choices from suitable materials such as bamboo, wood, card board, plastic, paper and straw.

Talk about

Refer learners to talk about questions for discussion on page 122 of the Learner's Book.

What are the proper ways of using simple machines?

Background information

Simple machines make work easier and faster. Some types of simple machines are levers, pulleys and inclined planes. These types of simple machines can be found at various work places.

What I have learnt

Refer learners to page 125 of the Learner's Book to read what is there of engage them to state what they learnt during the lesson.

Project for home or school

With the help of internet and parents, learners should find a lot more of simple machines and their uses.

Refer learners to page 124 of the Learner's Book and do work there. Collect, mark and give feedback of learners work to them.

Assessment for learning

Supervise learners to do the assessment tasks. Refer them to page 124 of the Learner's Book and pages 61 - 63 of the Workbook.

Answers to review exercises

Exercise 1

1. Simple machines are devices that make work easier and faster
2. Examples of simple machines
 - * Claw hammer
 - * Pliers
 - * Pair of scissors
 - * Wheel barrow
 - * Bottle opener
3. Inclined plane e.g. stair case
Lever e.g. wheel barrow.
4. Saves time.
Saves energy
5. i. Hammer, pliers, pincers.
ii. Hoe, wheel barrow.
iii. Pair of compass, pair of scissors.

Answers to Workbook

Trial 1

1. Simple machines are useful because:
 - They reduce effort needed to do work.
 - Extend the ability of people to perform tasks beyond their normal capabilities.
 - Makes work to be done faster.
 - Help do difficult works easier.
2. A rigid bar resting on a pivot, used to move a heavy or firmly fixed load with one end when pressure is applied to the other.
3. Ramps, sloping roads and hills, plows, chisels, hatchets, carpenter's planes, and wedges.

Trial 2

Accept appropriate drawings.

Trial 3

Inclined planes: Wooden board, ramps, car jack and wedge.

Levers: Pair of scissors, wheel barrow and claw hammer.

5

Strand:

**Humans and the
environment**

Strand 5: HUMANS AND THE ENVIRONMENT

Sub-strand I: PERSONAL HYGIENE AND SANITATION

LESSON 1: Causes, effects and prevention of foul body odours on humans

LB: pages 128 - 130; WB: pages 66 - 68

CONTENT STANDARD

B6.5.1.1 Recognise the importance of personal hygiene

INDICATOR

B6.5.1.1.1 Identify the causes and effects of foul body odour on humans and how it can be prevented

LEARNING EXPECTATIONS

Learners will:

- ♦ State the causes and effects of foul body odour on humans.
- ♦ Describe how foul body odor can be prevented.
- ♦ Describe and name materials that can be used to clean the body and prevent foul body odor.

NEW WORDS

Odour, shave, armpit, soap, body deodorant, spray handkerchief, lemon

RESOURCES

Videos, pictures, deodorants, body spray, handkerchief, lemon, handkerchief, card boards, coloured pencils, etc.

CORE COMPETENCIES

Critical thinking and Problem-Solving
Collaboration and communication.
Personal Development and Leadership
Digital literacy

SUBJECT SPECIFIC PRACTICES

Designing Experiment, Planning
Observing, Manipulating, Evaluating
Communicating, Generating

HELPFUL LINKS

- ♦ <https://www.medicalnewstoday.com/articles/173478#prevention>
- ♦ <https://www.medicalnewstoday.com/articles/173478#treatments>

Background Information

Keeping our bodies clean is very important. We must know the items we can use in keeping or preventing bad body odour. Some of these items are the lemon, deodorant and soap.

We must use a half cut lemon to rub our armpit to take away bad odour from our armpit before we take our bath. We can also apply deodorant on our armpit to keep our armpit dry and to smell good. We must change our clothes and wash them regularly too.

Starter

Engage in a discussion with learners to talk about what they use at home to prevent body odour.

Write major ideas from learners on the board.

Drill learners on the correct pronunciation and meanings of the new words.

Teaching Instructions

Activity 1

- Task learners, in groups of four to discuss the causes of body odour.
Let them prepare personal hygiene cards/posters for each learner in the group to write one cause of foul body odour and how it can be prevented.
- In a think-pair-share strategy, ask learners to present their ideas to the whole class.
- Write major ideas of learners on the board for more understanding.

Activity 2

- Present real items and materials (lime, lemon, deodorant, etc.) that can be used to prevent foul body odour to learners in class and demonstrate the correct use of the items in preventing body odour to the whole class.
Let them do same.

Activity 3

- Task learners to do the activity on page 127 of the Learner's Book for more understanding.
- Have them share their work with the whole class for feedback
- Also provide feedback to learners.

Talk about

Refer learners to talk about questions for discussion on page 129 of the Learner's Book.

"How often do we use lemon or deodorant in our armpit".

What I have learnt

Have learners write down what they have learnt or refer them to page 130 of the Learner's Book to read what is there.

Project for home or school

Task learners to use the internet to find out what community members use to prevent bad body odour.

Project

Task learners to draw and colour any of the items they found out from their search and use it to make a poster for a class science fair.

Assessment for learning

Supervise learners to do the assessment tasks. Refer them to page 129 of the Learner's Book and pages 66 - 68 of the Workbook.

Answers to Review Exercise:

Task learners to do the exercises in the review section of their learner textbook for more understanding.

Exercise 1

1. To keep us healthy.
To make us happy.
So we don't smell.
So we are confident when approaching others.

2. We must wash the hair well.
Apply oil/cream after bathing.
Comb our hair after bathing.
Keep our hair from growing bushy.
3. On the sun.

Answers to Workbook

Trial 1

- 1 a. Soap
b. Lemon or lime
c. Deodorant
d. Handkerchief
e. Shaving stick
2. It is important to learn about how to prevent body odour so that we
a. can maintain a body with good smell.
b. will not have other people who come closer to us inhale any unpleasant odour or smell to irritate them.
c. will not visit the hospital often to report of skin diseases which could have been avoided.
d. Can take good care of our sores if we get hurt by visiting the hospital for the nurse to treat our sores.
3. People:
a. Keep their armpits clean. They wash them using anti-bacterial soap so that the number of bacteria in that area will be kept low, resulting in less body odour.
b. Shave their armpits regularly to reduce the heat in that area.
c. Use deodorant or antiperspirant. Deodorant makes the armpit difficult for bacterial infection.

Trial 2

1. Yes
2. No
3. No
4. Yes
5. No
6. Yes
7. Yes
8. Rose should have used a handkerchief to wipe her face.

LESSON 2: Ways of minimising waste

LB: pages 131 - 133; WB: pages 69 - 70

CONTENT STANDARD

B6.5.1.1 Recognise the importance of personal hygiene.

INDICATOR

B6.5.1.1.2 Describe ways of minimizing waste

LEARNING EXPECTATIONS

Learners will:

- ◆ Describe ways of minimizing waste.
- ◆ Describe how value can be added to some materials to make them useful again.
- ◆ Explain why it is necessary to manage waste properly.

NEW WORDS

Waste, minimise, dustbin, decompose, dustpan.

RESOURCES

Videos or pictures on waste management, dustbin, dust pan, etc.

CORE COMPETENCIES

Critical thinking and Problem-Solving
Collaboration and communication.
Personal Development and Leadership
Digital literacy

SUBJECT SPECIFIC PRACTICES

Designing Experiment, Planning
Observing, Manipulating, Evaluating
Communicating, Generating

HELPFUL LINKS

- ◆ https://www.huffpost.com/entry/reduce-home-waste_n_57912d0be4b0fc06ec5c4b56
- ◆ https://www.youtube.com/watch?v=OasbYWF4_S8

Background information

Every day we gather a lot of waste from our homes, schools and also within our communities. We must however know how to

minimise waste and also how we can recycle and reuse items and materials.

Paper waste from homes, schools and within the communities can be gathered and used for toilet rolls. Plastic bottles can also be sorted out to be used for a lot of other things. House hold food waste can also be used to fertilize plants if these are properly sorted and prepared to form compost.

Starter

Ask learners to tell the class how they dispose of waste in their homes and school.

Drill learners on the correct pronunciation and meanings of the new words.

Teaching instructions

Activity 1

- Task learners in groups to discuss and come out with ideas to minimise waste in their classroom, school environment, homes and their communities.
- Have each group discuss measures of minimising waste in the classroom, school environment, home, market, at the bus station, hospitals, church, mosque, beach, etc.
- Take learners responses and write them on the board.

Activity 2

- Show videos or pictures that teaches and describes ways of minimising waste in the environment to learners.
- In a think-pair-share activity, have learners discuss what will happen if people do not minimise waste in the community.
- Write major answers on the board for learners to read for more understanding.

Activity 3

- Refer learners to page 132 of the Learner's Book to do the activity for more understanding.
- Provide feedback for learners to reinforce learning.

Talk about

Refer learners to talk about questions for discussion on page 133 of the Learner's Book.

"How can we recycle the waste we produce?"

What I have learnt

Task learners to write down in brief what they have learnt for the day and share with their friends through a group presentation. Also summarise major learning ideas for learners to write in their books or refer them to page 135 of the Learner's Book to read what is there.

Project for home or school

Assign learners to observe how waste is being minimized at home and then report on it.

Instruct learners to use the internet to find out how waste is minimized in other places. Then prepare a poster to show their information.

Check references and then check poster information for clarity after the project. Refer learner's to page 135 of the Learner's Book.

Assessment for learning

Supervise learners to do the assessment tasks on page 134 of the Learner's Book.

Refer them to pages 69 - 70 of the Workbook.

Answers to Review Exercise

Direct learners to refer to the Learner's Book and do the review exercise.

Answers to Workbook

Trial 1

1. We can minimize waste in our classrooms at school if we:
 - a. Use less paper.
 - b. Learn to do simple re-cycle practices.
 - c. Drop sharpened pencils and a labelled waste bin and dispose or throw it in a marked bin in your school for it to decompose.
2. The best way to minimize kitchen waste at home are as follows:
 - a. Label at least five containers for waste collection (e.g. plastic bottles, glass bottles, water sachet rubbers, tins and cans, food waste
 - b. Drop each waste produced from the kitchen in their respective containers
 - c. Do not purchase things or items you do not actually need to send home.
3.
 - a. False
 - b. Some waste produced at home can be re-cycled.
 - i. Cans from (milk, milo, sardine, etc) – can be used in making toy cars and cooking pans for playing.
 - ii. papers – can be re-used as decorations when coloured.
 - iii. food waste- put in our soil to decompose and add nutrients for the growth of plants and also to serve as manure for crops
 - iv. water rubber sachet waste- can be used to make items like school bags, shopping bags, purse, rain coats, etc.

Trial 2

1. True
2. True
3. Plastics
Glass bottles
Empty can foods
Empty can drinks

Strand 5: HUMANS AND THE ENVIRONMENT

Sub-strand 2: DISEASES

LESSON 1: Causes, symptoms and prevention of eczema

LB: pages 136 - 139; WB: pages 71 - 73

CONTENT STANDARD

B6.5.2.1 Demonstrate knowledge of common diseases of humans; causes, symptoms, effects and prevention

INDICATOR

B6.5.2.1.1 Explain the causes, symptoms and prevention of Eczema

LEARNING EXPECTATIONS

Learners will:

- ◆ Identify the causes of eczema,
- ◆ Tell the symptoms of eczema
- ◆ Tell how to prevent eczema.

NEW WORDS

Eczema, bacteria, virus, fungi.

RESOURCES

Videos or pictures on eczema disease.

CORE COMPETENCIES

Critical thinking and Problem-Solving
Collaboration and communication.
Personal Development and Leadership
Digital literacy

SUBJECT SPECIFIC PRACTICES

Observing, Communicating, Generating

HELPFUL LINKS

- ◆ <https://kidshealth.org/en/parents/eczema-atopic-dermatitis.html>
- ◆ <https://www.youtube.com/watch?v=fmurdUImalg>

Background information

Eczema is not infectious. It is an itchy rash that appears on the affected person. Children get the disease if their parents have the disease or have shown signs of the disease before. Other factors such as fungi, bacteria, virus and dust can cause the disease.

Starter

Ask learners who have had the eczema disease before to share their experiences with the whole class.

Drill learners on the correct pronunciation and meanings of the new words.

Teaching Instructions

Activity 1

- Show a video or pictures on the eczema disease to learners.
- Find out from learners what they saw in the video/pictures through a group presentation.
- Write major ideas from learners on the board.

Activity 2

- Task learners in groups of five to discuss the causes, symptoms and prevention of eczema.
- Have learners do a group presentation to share the causes, symptoms and prevention of eczema.
- Write major ideas on the board and explain further.

Activity 3

- Refer learners to page 137 of the Learner's Book to do the activity for more understanding.
- Provide feedback for learners to reinforce learning.

Talk about

Refer learners to talk about questions for discussion on page 136 of the Learner's Book.

"Why is it important to learn about eczema disease."

What I have learnt

Task learners to write down in brief what they have learnt for the day and share with their friends through a group presentation. Also summarise major learning ideas about eczema causes, symptoms and prevention to learners or you can refer learners to page 139 of the Learner's Book to read what is there.

Project for home or school

- Task learners to find out from home and in their neighbourhood the number of family members who have suffered from eczema before and record their information.
- They should suggest ways that can be used to prevent eczema to the community members.

Project

Task learners to make a poster to show how to prevent an eczema attack, by searching for information using the internet and other resources.

Additional activity

1. Find out from B5 class the number of learners who have suffered from eczema before.
2. Record your data.
3. Find out what might be the cause.

Look out for clarity of data from learners.

Assessment for learning

Supervise learners to do the assessment tasks. Refer them to pages 138 and 139 of the Learner's Book and page 71 - 73 of the Workbook.

Answers to Review Exercise

Exercise 1

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

Exercise 2

1. Learner's own answer
2. intense itching; red or brownish-gray patches; and thickened, scaly skin.

Answers to Workbook

Trial 1

1. Symptoms of eczema disease vary according to the age of the person with the disease. Some of the symptoms are as follows:
 - a. Scales on the skin.
 - b. Itches on the skin.
 - c. Patches on the skin.
 - d. Rashes on elbows, knees, scalp and cheeks.
2. Eczema can be triggered by environmental factors such as:
 - a. smoke
 - b. pollen
 - c. or it can be inherited from parents.
3. We can prevent eczema disease by doing the following:
 - a. Taking lukewarm baths
 - b. Applying moisturizer immediately after bathing every day.
 - c. Wearing cotton and soft fabrics
 - d. Avoid rough scratchy fabrics
 - e. Avoid tight fitting clothing
 - f. Bathing mild soap
 - g. Keeping fingernails short to prevent scratching from breaking the skin

Trial 2

Learners to design.

Trial 3

1. Eczema
2. True
3. True
4.
 - a. Itchy skin
 - b. the skin can become red and inflamed
5. The severe case of this disease can cause the skin to itch frequently such that bleeding on the skin can occur.

LESSON 2: Knowing the causes and prevention of meningitis

LB: pages 140 - 143; WB: pages 74 - 75

CONTENT STANDARD

B6.5.2.1 Demonstrate knowledge of common diseases of humans; causes, symptoms, effects and prevention.

INDICATOR

B6.5.2.1.2 Know how to prevent meningitis.

LEARNING EXPECTATIONS

Learner will:

- ♦ Identify the causes and symptoms of meningitis.
- ♦ Tell how to prevent meningitis.

NEW WORDS

Meningitis, meninges, brain, membrane, spinal cord, organ, nausea, appetite.

RESOURCES

Videos and pictures on the meningitis disease.

CORE COMPETENCIES

Critical thinking and Problem-Solving
Collaboration and communication.
Personal Development and Leadership
Digital literacy

SUBJECT SPECIFIC PRACTICES

Observing, Communicating, Generating

HELPFUL LINKS

- ♦ <https://kidshealth.org/en/parents/meningitis.html>
- ♦ https://www.youtube.com/watch?v=VitmObT3_jw

Background information

It is important to keep our surroundings clean all the time. We must also eat hygienic foods and drink clean water.

We must always wash our hands after shaking people and before we handle or touch any food. Meningitis can be caused by a virus, bacteria or fungi.

Meningitis is caused by a swollen membrane that surrounds the brain.

Starter

Let learners tell you why it is important to wash their hands:

- before and after eating food.
- after shaking someones hands.
- after visiting the washroom.

Drill learners on the correct pronunciation and meanings of the new words.

Teaching Instructions

Activity 1

- Show a video or pictures on meningitis disease to learners.
- Find out from them what they saw in the video/pictures through a group presentation.
- Write major ideas from learners on board.

Activity 2

- Task learners in groups of six to discuss the causes, symptoms and prevention of meningitis.
- Have learners do a group presentation to share the causes, symptoms and prevention of meningitis.
- Write major ideas on the board and explain further.

Activity 3

- Refer learners to page 141 of the Learner's Book to do the activity for more understanding.
- Provide feedback for learners to reinforce learning.

Talk about

Refer learners to talk about questions for discussion on page 142 of the Learner's Book.

"Why is it important you learn about the meningitis disease?"

What I have learnt

1. Task learners to write down in brief what they have learnt for the day and share with their friends through a group presentation.
2. Also summarise major learning ideas about meningitis causes, symptoms and prevention to learners.
3. You can also refer learners to page 143 of the Learner's Book to read.

Project for home or school

Task learners to find out from home and in their neighbourhood the number of family members who have suffered from meningitis before and then record their data.

Learners should suggest ways that can be used to prevent meningitis to these community members.

Project

Task learners to make a poster to show how to prevent meningitis attack using the internet and other resources.

Additional activity

Task learners to find out from B5 class the number of learners who have suffered from meningitis before. Learners should record their data.

Learners should also find out what might be the cause.

Look out for clarity of information and mode of presentation of information.

Assessment for learning

Supervise learners to do the assessment tasks. Refer them to pages 142 and 143 of the Learner's Book and page 74 - 75 of the Workbook.

Answers to review exercises

Exercise 1

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

Exercise 2

Meningitis can affect the brain and spinal cord. It is basically an inflammation of the membrane that surrounds these parts of the body.

Symptoms of this disease include headache and nausea. To prevent it we need to keep good personal hygiene.

Answers to Workbook

Trial 1

1. We need to learn about meningitis disease so that we:
 - a. Take good care of ourselves to prevent bacterial and virus infection.
 - b. We will learn to use personal protective equipment or items when we are cleaning our school bathrooms and toilets.
2. To prevent ourselves from getting meningitis we must:
 - a. learn to practice good personal hygiene.
 - b. We must also know the common symptoms of meningitis so that we quickly visit the hospital for treatment.
3. Meningitis is caused by a virus and a bacteria.
 - a. Meningococcal bacteria- there are several types, called A, B, C, W, X, Y and Z.
 - b. enteroviruses- viruses that usually only cause a mild stomach infection
 - c. The mumps virus
 - d. The herpes simplex virus- a virus that usually causes cold sores.

Trial 2

1. The severe case of meningitis is death.
2.
 - a. Loss of appetite
 - b. Headache
 - c. Nausea
 - d. skin rashes
3. False
4. True
5. False

Strand 5: HUMANS AND THE ENVIRONMENT

Sub-strand 3: SCIENCE AND INDUSTRY

LESSON 1: Scientific concepts and principles of industries

LB: pages 144 - 147; **WB:** pages 76 - 78

CONTENT STANDARD

B6.5.3.1 Recognise the impact of science and technology on society

INDICATOR

B6.5.3.1.1 Identify the scientific concepts and principles underlying the operation of some industries

LEARNING EXPECTATIONS

Learners will:

- ◆ Explain the scientific concepts and principles underlying some operations of some industries.
- ◆ Relate scientific findings to what happens in industries.
- ◆ Tell some processes in industry and their scientific bases.

NEW WORDS

Cassava, gari, kenkey, gari, palmunt.

RESOURCES

Videos and pictures of some local industries.

CORE COMPETENCIES

Digital literacy, Critical thinking and Problem-Solving, Cultural identity and global citizenship, Collaboration and communication

SUBJECT SPECIFIC PRACTICES

Designing Experiment Planning, Observing, Generating

HELPFUL LINKS

- ◆ <https://www.youtube.com/watch?v=zBXbdW9CvE8>
- ◆ <https://www.youtube.com/watch?v=nLqU07EO9wE>

Background information

Local industries in our communities are useful. Out of some of these local industries, we get food to eat. For example, gari and palm oil are all made from our local industries.

Other local industrial products are coconut oil, sheanuts, butter oil, etc. Our local people use a step by step procedure to be able to come out with a good product for the public.

Gari, which is granular flour of varying texture, is a widely patronised Ghanaian food item. Gari is made from cassava which are peeled, grated, left to ferment and then fried in a dry pan.

In preparing kenkey, corn is soaked overnight, washed with clean water and milled. The powder is mixed with some water and allow to ferment before it is cooked into kenkey for consumption. The heating kills the bacteria responsible for the fermentation and stops further fermentations.

Starter

Engage learners in a discussion to mention some local industries they know. Examples, gari processing, palm oil processing, refinery, fish cannery, bakery, carpentry, dress making, etc.

Drill learners on the correct pronunciation and meanings of the new words.

Teaching Instructions

Activity 1

- Show a video or pictures on the process of making gari (gari processing) to learners.
- Find out from them what they saw in the video/pictures through group presentations.
- Write major ideas from learners on board.

Activity 2

Prepare for this activity in advance.

- Take learners on a trip to visit any local industry within the community. Examples, kenkey, gari processing, palm oil processing, dress makers, carpentry shop, bakeries, etc.
- In groups of five, task learners to carefully observe and record the processes used by the industry in making their products.

- Back in the classroom, ask each group to present their findings in a whole class discussion.
- Write major ideas on the board and explain further.

Activity 3

- Refer learners to page 145 of the Learner's Book to do the activity for further understanding of the lesson.
- Provide feedback for learners to reinforce learning.

Talk about

Refer learners to talk about questions for discussion on page 145 of the Learner's Book. "Why is it important to learn about principles underlying operations of some industries?"

What I have learnt

1. Task learners to write down in brief what they have learnt for the day and share with their friends through a group presentation.
2. You can also refer them to page 147 of the Learner's Book to read what is there.

Projects for home or school

Task learners to find out using the internet three other local industries within their region. Task learners to write the principles underlying these industries.

Project

Task learners to identify any local industry in any African country and describe the principles underlying what they produce. Learners are to make a poster with the information they get from their internet search.

Assessment for learning

Supervise learners to do the assessment tasks. Refer them to pages 146 and 147 of the Learner's Book and page 76 - 78 of the Workbook.

Answers to Review exercise

Exercise 2

Product	Raw Materials
Gari	cassava
Kenkey	maize
Oil	palm fruits

Answers to Workbook

Trial 1

1. Some local industries we see in our community or in nearby communities are:
 - a. Kenkey making industries
 - b. Gari making industries
 - c. Palm oil making industries
 - d. Palm kernel local industries
2. Some raw materials used by the local industries are as follows:
 - a. Kenkey making industries – raw material is corn dough
 - b. Gari making industries – cassava dough
 - c. Palm oil making industries – palm nut
 - d. Palm kernel local industries – palm kernel
3. Four local industries in Ghana are:
 - a. Pottery industries – they produce pots
 - b. Soap industries – they produce liquid and bar soaps
 - c. Local drink industries- they produce local drinks
 - d. Salt industries – they produce local salts and iodated salts

Trial 2

1. When the corn is left untouched, it ferments.
2. Cooking the fermented corn dough using heat to boil.
3. During cooking and heating, it kills the bacterial which is responsible for the fermentation and then stops the fermentation process completely.

Trial 3

1. Starch is the substance which is actually drained.
2. The cassava dough is drained to remove the starch component from it.
3. Cassava is peeled and milled. Then squeezed, dried and fried in a dry powdered form, till it becomes crispy.

Strand 5: HUMANS AND THE ENVIRONMENT

Sub-strand 4: CLIMATE CHANGE

LESSON 1: Effects of climate change on humans

LB: pages 148 - 152; WB: pages 79 - 81

CONTENT STANDARD:

B6.5.4.1 Know that climate change is one of the most important environmental issues facing the world today.

INDICATOR

B6.5.4.1.1 Know the effects of climate change on humans

LEARNING EXPECTATIONS

Learners will:

- ♦ Describe the climate change.
- ♦ Speculate what is going to happen if climate change is not stopped.
- ♦ Suggest some things that can be done to help halt climate change.

NEW WORDS

Climate, oxygen, floods, temperature, atmosphere, carbon dioxide, greenhouse effect.

RESOURCES

Videos and pictures on climate change, paper, cardboard, pencils, poster colours, fabric, etc.

CORE COMPETENCIES

Digital literacy, Critical thinking and Problem-Solving, Cultural identity and global citizenship, Collaboration and communication

SUBJECT SPECIFIC PRACTICES

Designing Experiment, Planning, Observing, Communicating, Generating, Analysing, Evaluating

HELPFUL LINKS

- ♦ <https://www.youtube.com/watch?v=FGs2QQWFqyQ>

Background information

Climate change is one of the environmental issues affecting the world currently. It is explained as a change in conditions such as temperature and rainfall on the earth over a period of time.

When we cut down trees in our neighbourhood and in the forest, we destroy the land. We reduce the amount of oxygen in the environment. We increase erosion. We increase the climate change and its effects. Some climate change effects are excessive flooding, excessive drought, and excessive warm weather conditions. These destroy farm crops.

Starter

Ask learners to tell you what will happen when it rains heavily for a whole day.

Drill learners on the correct pronunciation and meanings of the new words.

Teaching Instructions

Activity 1

- Show pictures or videos of flooding, forest depletion/deforestation and drought to learners.
Let them tell you what they see and the effects they will have on the community.
- In a whole class discussion, ask learners what will happen if there is increase in temperature for a long time.
- Engage learners in a **think-pair-share** activity to come out with ways of controlling the causes of climate change.
- Have learners present their ideas in class for feedback.

Activity 2

- Guide learners to design a poster, banner or placards on the effects and prevention of climate change. They can use paper, cardboard or fabric.

- Take learners out on an awareness campaign on climate change issues in the school and nearby community. They should use the placards, posters and banners they designed.

Activity 3

- Put learners into groups of four to plant and nurture trees at vantage points in the school environment.
- Have learners water their trees, monitor its growth and report on each tree planted every two weeks.
- Ask learners to predict what will happen if there were no trees in the world.
- Refer learners to page 149 of the Learner's Book to do the activity in their book for more understanding.
- Provide feedback for learners to reinforce learning.

Talk about

Refer learners to talk about questions for discussion on page 149 of the Learner's Book.

"What will happen if we stop cutting down trees?"

"How will you protect your home environment from the hot sun and changing climate?"

What I have learnt

Task learners to write down in brief what they have learnt for the day or you can refer them to page 145 of the Learner's Book to read what is there.

Project for home or school

Task learners to design a poster to show the effects of climate change on humans.

Project

Task learners to design a poster to show their community members how they can reduce the warm temperatures in their locality.

Assessment for learning

Supervise learners to do the assessment tasks. Refer them to pages 151 and 152 of the Learner's Book and page 79 - 81 of the Workbook.

Answers to review exercise

Exercise 1

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

Exercise 2

1. Learner's answer.
2. Learner's answers
3. Learner's answer.
4. Mango tree, Pawpaw tree, Guava tree, Peer tree, Neem tree, etc
5. Trees release oxygen into the atmosphere. Trees give shade. Trees prevent flooding. Trees serve as a home for many animals, etc.

Answers to Workbook

Trial 1

Poster responses:

1. Trees provide the following:
 - a. Shade
 - b. habitat for insects and other animals such as fying animals
 - c Release oxygen into the atmosphere which is useful to humans and other animals.
- a. Prevents the excessive rays of the sun from reaching the earth.
- b. Prevents flooding
- c. Prevents desertification

Trial 2

1. Benefits of trees to me are as follows:
 - a. Some trees serve as medicinal plants.
 - b. Trees like the neem tree is used for making cosmetics.
 - c. Some trees are a home for other insects and animals which are all needed in the ecosystem.
 - d. Trees are also used in making furniture and other products.
2. It is important for us to protect our climate by taking good care of trees in our communities because trees:
 - a. More trees in our environment will mean more oxygen in the environment and less carbon dioxide in the environment. More oxygen in the environment will reduce or lessen the rate of climate change effect in our communities.

- b. Are a source of home for flying animals and other animals including insects.
 - c. Provide essential support for water bodies and having trees by water bodies for example will protect the water body from any danger such as flooding or otherwise.
3. When we cut down trees the following happens:
- a. We destroy the forest region
 - b. We destroy the land
 - c. We reduce the amount of oxygen that is released into the atmosphere for humans to make us of.
4. This saying implies that man depends on trees for survival. More trees in the environment will release more oxygen. Lesser number of trees implies lesser amount of oxygen released into the atmosphere or the environment. Human beings will therefore not get enough oxygen to breath. This will actually lead to a lot of deaths.

Trial 3

- 1. We must plant more trees and stop the flooding and educate community members to stop activities that can cause climate change
- 2. Two countries that have suffered from floods within the past ten years are:
 - a. Ghana
 - b. Philippines
 - c. Pakistan , etc
- 3. Philippines.

ESSENTIAL Science

Primary 6

Teacher's Guide

The **ESSENTIAL Science** series is written to meet the full requirements of the current New Standards-based curriculum by the National Council for Curriculum and Assessment (**NCCA**) with a critical thinking approach to learning Science.

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