

MINISTRY OF EDUCATION



REPUBLIC OF GHANA

SCIENCE
CURRICULUM FOR PRIMARY SCHOOLS
(BASIC 4 - 6)

SEPTEMBER 2019



Science Curriculum for Primary Schools

Enquiries and comments on this Curriculum should be addressed to:
The Executive Secretary
National Council for Curriculum and Assessment (NaCCA)
Ministry of Education
P. O. Box CT PM 77
Cantonments
Accra
Telephone: 0302909071, 0302909862
Email: info@nacca.gov.gh
Website: www.nacca.gov.gh



Ministry of Education
Ghana

© 2019 National Council for Curriculum and Assessment (NaCCA).
This publication is not for sale. All rights reserved. No part of this
publication may be reproduced without prior written permission
of the Ministry of Education, Ghana



FOREWORD

The new curriculum for Ghana's primary schools is standards-based, which is our demonstration of placing learning at the heart of every classroom and ensuring that every learner receives quality education. Provision of accessible quality education for all is non-negotiable if we are to meet the human capital needs of our country, required for accelerated sustainable national development. It is for this reason that the new curriculum sets out clearly the learning areas that need to be taught, how they should be taught and how they should be assessed. It provides a set of core competencies and standards that learners are to know, understand and demonstrate as they progress through the curriculum from one content standard to the other and from one phase to the next. The curriculum and its related teachers' manual promote the use of inclusive and gender responsive pedagogy within the context of learning-centred teaching methods so that every learner can participate in every learning process and enjoy learning. The curriculum encourages the use of Information and Communication Technologies (ICTs) for teaching and learning – ICTs as teaching and learning materials.

The new curriculum has at its heart the acquisition of skills in the 4Rs of Reading, wRiting, aRithmetic and cReativity by all learners. It is expected that at any point of exit from a formal education, all learners should be equipped with these foundational skills for life, which are also prerequisites for Ghana becoming a learning nation. The graduates from the school system should become functional citizens in the 4Rs and lifelong learners. They should be digital literates, critical thinkers and problem solvers. The education they receive through the study of the learning areas in the curriculum should enable them to collaborate and communicate well with others and be innovative. The graduates from Ghana's schools should be leaders with a high sense of national and global identity. The curriculum therefore provides a good opportunity in its design to develop individuals with the right skills and attitudes to lead the transformation of Ghana into an industrialised learning nation.

For this reason, the Ministry of Education expects that learners, as a result of the new knowledge, skills and values they have acquired through the new curriculum, will show a new sense of identity as creative, honest and responsible citizens. These are our core values that underpin the identification and selection of the learning areas for this curriculum. These core values serve as fundamental building blocks for developing into our learners the spirit of teamwork, respect, resilience and the commitment to achieving excellence. The Ministry endorses a quality learning experience as an entitlement for each of Ghana's school-going girl and boy; the curriculum has rightly focused on learning and learning progression. The Ministry has also endorsed accountability as a critical domain for effective workings of standards-based curriculum.

More importantly the role of the teacher is to make this curriculum work for the intended purpose - to inculcate in learners the core competencies and values and to make learning happen; improve learning outcomes – and the support that teachers need is duly recognised and endorsed by my Ministry. The Ministry will support the implementation of the curriculum to include capacity development of all teachers in the new curriculum. Teachers matter in the development and delivery of the standards-based curriculum and we will continue to support our teachers on this journey that we have started together to put learning at the centre of what we do best; teach!

I thank all those who have contributed their time and expertise to the development of this curriculum for primary schools in Ghana.

Dr. Matthew Opoku Prempeh (MP)
The Honourable Minister of Education

TABLE OF CONTENTS

FOREWORD.....	Error! Bookmark not defined.
PHILOSOPHY	Error! Bookmark not defined.
GENERAL AIMS	Error! Bookmark not defined.
CORE COMPETENCIES	Error! Bookmark not defined.
ORGANISATION OF THE CURRICULUM.....	xvii
SCOPE AND SEQUENCE.....	Error! Bookmark not defined.
BASIC 4.....	2
STRAND 2: CYCLES.....	5
STRAND 3: SYSTEMS.....	8
STRAND 4: FORCES AND ENERGY	10
STRAND 5: HUMANS AND THE ENVIRONMENT	13
BASIC 5.....	17
STRAND 1: DIVERSTY OF MATTER.....	17
STRAND 2: CYCLES.....	20
STRAND 3: SYSTEMS.....	23
STRAND 4: FORCES AND ENERGY	25
STRAND 5: HUMANS AND THE ENVIRONMENT	29
BASIC 6.....	34

STRAND 1: DIVERSITY OF MATTER.....	34
STRAND 2: CYCLES.....	36
STRAND 3: SYSTEMS.....	38
STRAND 4: FORCES AND ENERGY	40
STRAND 5: HUMANS AND THE ENVIRONMENT	44

RATIONALE FOR PRIMARY SCIENCE

Science forms an integral part of our everyday life 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 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 origin 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 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 science 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 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.

GENERAL AIMS

The curriculum is aimed at developing individuals to become scientifically literate, good problem solvers, have the ability to think creatively and have both the confidence and competence to participate fully in Ghanaian society as responsible local and global citizens.

SUBJECT AIMS

The science curriculum is designed to help learners to:

- I. Develop the spirit of curiosity, creativity, innovation and critical thinking for investigating and understanding their environment.

2. Develop skills, habits of mind and attitudes necessary for scientific inquiry.
3. Communicate scientific ideas effectively.
4. Use scientific concepts in explaining their own lives and the world around them.
5. Live a healthy and quality life.
6. Develop humane and responsible attitude towards the use of all resources of Ghana and elsewhere.
7. Show concern and understanding of the interdependence of all living things and the Earth on which they live.
8. Design activities for exploring and applying scientific ideas and concepts.
9. Develop skills for using technology to enhance learning.
10. Use materials in their environment in a sustainable manner.

INSTRUCTIONAL EXPECTATIONS

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.

CORE COMPETENCIES

The core competences describe a body of skills that teachers at all levels should seek to develop in their learners. They are ways in which teachers and learners engage with the subject matter as they learn the subject. The competences 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 analyse and solve problems. Critical thinking and problem solving skill enables 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 socioeconomic 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

KNOWLEDGE, UNDERSTANDING AND APPLICATION

Under this domain, learners acquire knowledge through some learning experiences. They may also show understanding of concepts by comparing, summarising, re-writing 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. At a much more higher level, the learner may be required to synthesize knowledge by integrating a number of ideas to formulate a plan, solve a problem, compose a story, or a piece of music. Further, the learners may be required to evaluate, estimate and interpret a concept. At the last level, which is the highest, learners may be required to create, invent, compose, design and construct. These learning behaviours “knowing”, “understanding”, “applying”, “analysing”, “synthesising”, “evaluating” and “creating” fall under the domain “Knowledge, Understanding and Application”.

In this curriculum, learning indicators are stated with action verbs to show what the learner should know and be able to do. For example, the learner will be able to describe something. Being able to “describe” something after teaching and learning has been completed means that the learner has acquired “knowledge”. Being able to explain, summarise, and give examples etc. means that the learner has understood the concept taught.

Similarly, being able to develop, defend, etc. means that the learner can “apply” the knowledge acquired in some new context. You will note that each of the indicators in the curriculum contains an “action verb” that describes the behaviour the learner will be able to demonstrate after teaching and learning has taken place. “Knowledge, Understanding and Application” is a domain that should be the prime focus of teaching and learning in schools. Teaching in most cases tends to stress **on** knowledge acquisition to the detriment of other higher level behaviours such as applying knowledge.

Each action verb in any indicator outlines the underlying expected outcome. Each indicator must be read carefully to know the learning domain towards which you have to teach. The focus is to move teaching and learning from the didactic acquisition of “knowledge” where there is fact memorisation, heavy reliance on formulae, remembering facts without critiquing them or relating them to real world – **surface learning** – to a new position called – **deep learning**. Learners are expected to deepen their learning by knowledge application to develop critical thinking skills and to generate creative ideas to solve real life problems in their school lives and later in their adult lives. This is the position where learning becomes beneficial to the learner.

The explanation and the key words involved in the “Knowledge, Understanding and Application” domain are as follows:

Knowing: The ability to remember, recall, identify, define, describe, list, name, match, state principles, facts and concepts. Knowledge is the ability to remember or Recall concepts already learnt and this constitutes the lowest level of learning.

Understanding: The ability to explain, summarise, translate, rewrite, paraphrase, give examples, generalise, estimate or predict consequences based upon a trend. Understanding is generally the ability to grasp the meaning of some concepts that may be verbal, pictorial, or symbolic.

Applying: This dimension is also referred to as “Use of Knowledge”. Ability to use knowledge or apply knowledge, apply rules, methods, principles, theories, etc. to situations that are new and unfamiliar. It also involves the ability to produce, solve, plan, demonstrate, discover etc.

Analysing: The ability to break down concept/information into its component parts; to differentiate, compare, distinguish, outline, separate, identify significant points etc., ability to recognise unstated assumptions and logical fallacies; ability to recognise inferences from facts etc.

Synthesising: The ability to put parts or ideas together to form a new whole. It involves the ability to combine, compile, compose, devise, plan, revise, organise, create, generate new ideas and solutions.

Evaluating: The ability to appraise, compare features of different things and make comments or judgment, contrast, criticise, justify, support, discuss, conclude, make recommendations etc. Evaluation refers to the ability to judge the worth or value of some concepts based on some criteria.

Creating: The ability to use information or materials to plan, compose, produce, manufacture or construct other products.

From the foregoing, creating is the highest form of thinking and learning and is therefore a very important behaviour. This unfortunately, is the area where most learners perform poorly. In order to get learners to develop critical thinking, skills beginning right from the lower primary level, it is advised that you do your best to help your learners to develop analytic skills as we have said already.

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 gargets 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.

ATTITUDES AND VALUES

To be effective, competent and reflective citizens, who will be willing and capable of solving personal and societal problems, learners should be exposed to situations that challenge them to raise questions and attempt to solve problems. Learners, therefore need to acquire positive attitudes, values and psychosocial skills that will enable them participate in debates and take a stand on issues affecting them and others.

Attitudes

- i. **Curiosity:**
The inclination or feeling toward seeking information about how things work in a variety of fields.
- ii. **Perseverance:**
The ability to pursue a problem until a satisfying solution is found.
- iii. **Flexibility in ideas:**
Willingness to change opinion in the face of more plausible evidence.
- iv. **Respect for Evidence:**
Willingness to collect and use data in one’s investigation, and also have respect for data collected by others.
- v. **Reflection:**
The habit of critically reviewing ways in which an investigation has been carried out to see possible faults and other ways by which the investigation could be improved upon.

The teacher should endeavour to ensure that learners cultivate the above scientific attitudes and process skills as a prelude to effective work in science.

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 nation development. The curriculum promotes social cohesion.

Equity: The 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 which 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 whatever field 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. In addition, be morally upright with the attitude of doing the right thing even when no one is watching. Also, 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 learning processes to allow learners to apply skills and competences in the world of work.

The action verbs provided in the learning domains in each content standard should help you to structure your teaching to achieve the desired learning outcomes. Select from the action verbs provided for your teaching, for evaluation exercises and for test construction. Check the learning indicators to ensure that you have given the required emphasis to each of the learning domains in your teaching and assessment.

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 ascertain their learner's 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 forms the basis for refining teaching-learning strategies. Learners are assisted to play their roles and to take responsibility of their own learning to improve performance. Learners are assisted to set their own goals and monitor their progress.

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

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

It must be emphasised 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 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.

SUGGESTED TIME ALLOCATION

A total of four periods a week, each period consisting of thirty minutes, is allocated to the teaching of Science at the Upper Primary level. It is recommended that the teaching periods be divided as follows:

Theory: 2 periods per week (two periods of 30 minutes each)

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

PEDAGOGICAL APPROACHES

These include the approaches, methods and strategies for ensuring that every learner benefits from appropriate and relevant teaching and learning episodes which are timely assessed and feedback provided to the learner and other stakeholders such as parents and education authorities. It includes the type and use of appropriate and relevant teaching and learning resources to ensure that all learners attain the expected level of learning outcomes. The curriculum emphasises:

- 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
- use questioning techniques that promote deeper learning

LEARNING-CENTRED PEDAGOGY

The learner is at the centre of learning. At the heart of the curriculum is an emphasis on learning progression and improvement of learning outcomes for Ghana's young people with a focus on the 4Rs – Reading, wRiting, aRithmetic and cReativity. It is expected that at each curriculum phase, learners would be offered the essential learning experiences to progress seamlessly to the next phase. Where there are indications that a learner is not sufficiently ready for the next phase a compensatory provision through differentiation should be provided to ensure that such a learner is ready to progress with his/her cohort. At the primary school, the progression phases are: pre-primary (KGI – 2), primary phases (B1 – B3 and B4 to B6).

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 learning centred classroom is a place for the learners to discuss ideas and through the inspiration of the teacher actively engage in looking for answers through working in groups to solve problems. This also includes researching for information and analysing and evaluating the information obtained. The aim of the learning-centred classroom approach is to develop learner autonomy so that learners can take ownership of their learning. It provides the opportunity for deep and profound learning to take place.

The teacher should create a learning atmosphere that ensures:

- Learners feel safe and accepted.
- Learners are given frequent opportunities to interact with varied sources of information, teaching and learning materials and ideas in a variety of ways.
- The teacher assumes the position of a facilitator or coach who: Helps learners to identify a problem suitable for investigation via project work.
- Problems are connected to the context of the learners' world so that it presents authentic opportunities for learning.

- Subject matter around the problem, not the discipline.
- Learners responsibly define their learning experience and draw up a plan to solve the problem in question.
- Learners collaborate whilst learning.
- Demonstrate the results of their learning through a product or performance.

It is more productive for learners to find answers to their own questions rather than for teachers to provide the answers and their opinions in a learning-centred classroom.

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 learner's 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.

DIFFERENTIATION 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 between learners (learning styles, interest and readiness to learn etc.) are accommodated so that all students in a group have best chance of learning. Differentiation could be by task, support and 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 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 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 outcome. This support may include a referral to a Guidance and Counselling Officer for academic support.

Differentiation by outcome involves the teacher 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 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 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.

INFORMATION AND COMMUNICATION TECHNOLOGY

ICT has been integrated into this curriculum as a teaching and learning tool to enhance deep and independent learning. Some of the expected outcomes that this curriculum aims to achieve through ICT use for teaching and learning are:

- improved teaching and learning processes.
- improved consistency and quality of teaching and learning.
- increased opportunities for more learner-centred pedagogical approaches.

- improved inclusive education practices by addressing inequalities in gender, language, ability.
- improved collaboration, creativity, higher order thinking skills.
- enhanced flexibility and differentiated approach of delivery.

The use of ICT as a teaching and learning tool is to provide learners access to large quantities of information online. It also provides the framework for analysing data to investigate patterns and relationships in a geographical context. Once pupils have made their findings, ICT can then help them organize, edit and present information in many different ways.

Learners need to be exposed to the various ICT tools around them including calculators, radios, cameras, phones, television sets and computer and related software like Microsoft Office packages – Word, PowerPoints and Excel as teaching and learning tools. The exposure that learners are given at the Primary School level to use ICT in exploring learning will build their confidence and will increase their level of motivation to apply ICT use in later years, both within and outside of education. ICT use for teaching and learning is expected to enhance the quality and learners' level of competence in the 4R

ORGANISATION OF THE CURRICULUM

The 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: B4 .2.4.1.2

ANNOTATION	MEANING / REPRESENTATION
B4	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.

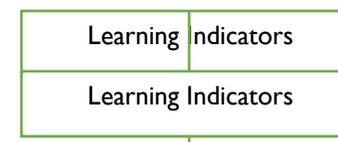
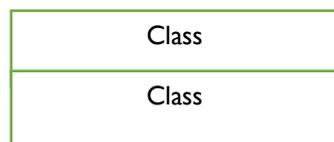
Sub-strands are the topics within each strand under which the content is organised.

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 facilitators/teachers in the delivery of the curriculum.

ILLUSTRATION



Strand I: DIVERSITY OF MATTER			
Sub-strand I: 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

STRUCTURE

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

SCOPE AND SEQUENCE

STRAND	SUB-STRANDS	B1	B2	B3	B4	B5	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	√	√	√	√	√	√

BASIC 4

BASIC 4

STRAND I: DIVERSITY OF MATTER

SUB-STRAND I: LIVING AND NON-LIVING THINGS

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
<p>B4.1.1.1 Understand the physical features and life processes of living things and use this understanding to classify them</p>	<p>B4.1.1.1.1 Classify animals into insects, birds, mammals and reptiles</p> <ul style="list-style-type: none"> • Learners embark on a walk to observe and record names of different kinds of animals in their community or show videos and pictures of different kinds of animals. • Learners talk about the different animals based on their limbs, body covering, height, shape, size, where they live, how they move, what they eat. etc. • Provide flashcards of many different animals to learners in groups. • Assist learners to sort the pictures into insects, birds, mammals and reptiles and produce animal classification cards or tables. • Learners display and do presentations on their group work. • Learners to give reasons for their classifications. • Ask Learners to identify things which are common to all the different kinds of animals. • Assist learners to mould different kinds of animals using suitable materials (such as blu tack, clay, cardboard etc.). • Learners draw different kinds of animals (insects, birds, mammals and reptiles). <p>B4.1.1.1.2 Know life processes of animals (movement, nutrition and reproduction)</p> <ul style="list-style-type: none"> • Learners observe videos and pictures depicting movement, nutrition and reproduction in animals. • Learners describe how various animals (insects, birds, reptiles and mammals) move, feed and reproduce. • Learners role-play or pantomime movement and nutrition of animals. • In groups, learners discuss the importance of movement, nutrition and reproduction to animals. <p>NB: Teachers should collect and preserve some common animals for presentation.</p>	<p>Core Competencies</p> <p>Digital Literacy Personal development and leadership Critical Thinking and Problem-Solving Communication and Collaboration Creativity and Innovation</p> <p>Subject Specific Practices</p> <p>Observing Analysing Classifying Generalising</p>

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
<p>B4.1.1.2 Understand the differences between living things and things which have never been alive</p>	<p>B4.1.1.2.2 Describe the physical appearance of different types of plants (trees, shrubs, climbing, creeping)</p> <ul style="list-style-type: none"> • Take learners out to observe different types of plants. Pictures and videos can also be used. • Learners describe the physical features of different types of plants (in terms of their structure and size). <p>Project: <i>Learners create a plant album of different types of plants. (shrubs, trees, climbing and creeping plants).</i></p>	<p>Core Competencies Digital Literacy Creativity and innovation Personal development and leadership Communication and Collaboration. Critical Thinking and Problem-Solving</p> <p>Subject Specific Practices Observing, Communicating Manipulating, Creating</p>
<p>SUB-STRAND I CONT'D</p> <p>B4.1.1.2 Understand the differences between living things and things which have never been alive</p>	<p>B4.1.1.2.3 Describe the physical features of mammals, reptiles, insects and amphibians</p> <ul style="list-style-type: none"> • Learners observe mammals, reptiles, insects and amphibians through videos and pictures (or relevant specimen such as frogs, lizards, cockroaches). • Learners are guided to use think pair-share to identify and discuss the animals they have observed. • Learners describe the physical features of the animals stated in terms of their limbs, body covering, height, shape, size, where they live, how they move and what they eat. • Learners, in a matching activity, use flashcards to match specific animals with their identified physical features. 	<p>Core Competencies Digital Literacy Communication and Collaboration.</p> <p>Subject Specific Practices Observing Analysing Communicating Classifying</p>

SUB-STRAND 2: MATERIALS

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
<p>B4.1.2.2 Understand mixtures, their types, formation, uses and ways of separating them into their components</p>	<p>B4.1.2.2.1 Identify a liquid-liquid mixture and describe how to separate its components</p> <ul style="list-style-type: none"> • Display different types of liquids for learners to observe, e. g. water, kerosene, cooking oil, milk, soft drinks, etc. • Task learners to identify the liquids provided. • In groups, learners mix liquids of the same kind, different kinds and then observe and record their findings, e.g., vinegar and water, palm oil and water, etc. • Engage learners in discussion to describe the different types of liquid-liquid mixtures. [Those which are able to mix uniformly (miscible liquids) and those which are not able to mix uniformly (immiscible)]. <p>Project: <i>Separation of a mixture of immiscible liquids. Learners investigate to separate a mixture of immiscible liquids such as cooking oil and water.</i></p> <p>NB: This activity can be undertaken with the aid of a separating funnel or an improvised version of it. Do not bring liquids that are flammable or poisonous to class for this lesson.</p>	<p>Core Competencies Critical Thinking and Problem-Solving Personal development and leadership Communication and Collaboration.</p> <p>Subject Specific Practices Observing Analysing Manipulating</p>

STRAND 2: CYCLES
SUB-STRAND 1: EARTH SCIENCE

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
<p>B4.2.1.1 Recognise that some events in our environment occur recurrently</p>	<p>B4.2.1.1.1 Demonstrate understanding of cyclic movements in the environment</p> <ul style="list-style-type: none"> • Guide learners to build a pendulum (a ball hanging on a string) and let them observe the swinging motion. • Learners observe the following movements: <ol style="list-style-type: none"> (1) the second hands on an analogue clock (2) merry-go-round (3) a swinging pendulum, (4) movement of their limbs during walking. • Assist learners to come out with one thing that is common to all the movements. <p>Project: <i>Life Cycle of a Maize Plant</i> Learners investigate the life cycle of a maize plant and report on their findings.</p>	<p>Core Competencies Critical Thinking and Problem-Solving Communication and Collaboration</p> <p>Subject Specific Practices Observing, Generalizing Analysing, Communicating Reporting</p>
<p>B4.2.1.2 Recognise the relationship between the earth and the sun</p>	<p>B4.2.1.2.1 Identify the objects in the sky during day and night</p> <ul style="list-style-type: none"> • Ask learners to step outside the classroom and: (a) name the objects in the daytime sky; (b) identify the objects in the night time sky; (c) identify the differences and similarities in day and night sky, (d). answer the question: what happens to the sky in a 24-hour cycle? • Learners draw Venn diagrams (2 circles then another circle overlapping the two) and put in them the things they see in the night sky, day sky and then in both skies and display their work on the classroom walls. • Learners write about the importance of the things they see in the skies. 	<p>Core Competencies Personal Development and Leadership Critical Thinking and Problem-Solving.</p> <p>Subject Specific Practices Analysing Evaluating Generalising</p>
<p>B4.2.1.3 Show understanding of the roles of condensation, evaporation, transpiration and precipitation in the hydrological (water) cycle</p>	<p>B4.2.1.3.1 Demonstrate the process of evapotranspiration</p> <ul style="list-style-type: none"> • Guide learners are guided to breathe out or blow air onto a transparent surface, e.g. a glass or plastic bottle and share their observations. • Explain to learners that just as humans release water vapour when they respire, so do plants when they transpire. • Put learners into groups and give each group a young potted plant, plastic wrap bag and a rubber band to undertake the following activities: <ol style="list-style-type: none"> (1) Let learners examine the surface of the leaves of the plants and mop off any water droplets on the leaves. (2) Tie the plastic wrap bag around the plant up to the stem and leave it for an hour. (3) Observe both plant and plastic wrap surfaces. (4) Let learners report on what happens. 	<p>Core Competencies Personal development and leadership Communication and Collaboration</p> <p>Subject Specific Practices Observing, Manipulating Analysing and Communicating</p>

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
<p>B4.2.1.5 Recognise water and air as important natural resources</p>	<p>B4.2.1.5.1 Demonstrate ways of making water safe for use</p> <ul style="list-style-type: none"> • Learners identify the sources of water in the community. • Learners discuss qualities of good drinking water. • Provide learners with samples of water from the following sources: rivers, wells, lagoons, boreholes, ponds and standpipe, etc. • Learners brainstorm on how to make water safe for use. • Learners, in groups, demonstrate the different ways of making water safe. For example, filtering, boiling, addition of iodine tablets, use of chlorine, use of water filters, addition of alum, etc. • Learners discuss the dangers of drinking unsafe water. <p>Note: Teacher to supply materials for this activity. Precaution: Learners must not taste any of the water samples used in the lesson.</p>	<p>Core Competencies Personal development and leadership Critical Thinking and Problem-Solving Communication and Collaboration</p> <p>Subject Specific Practices Observing, Manipulating Analysing, Communicating</p>

SUB-STRAND 2: LIFE CYCLES OF ORGANISMS

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
<p>B4.2.2.1 Demonstrate understanding of the life cycle of plants</p>	<p>B4.2. 2.1.1. Observe, identify and give functions of the parts of a plant</p> <ul style="list-style-type: none"> • Learners, in groups, uproot young plants from the school surroundings for a class activity. • Learners observe, identify and give functions of parts of the plants (roots, stem, leaves and flower). • Learners draw annotated diagrams of the plants and display them in class. • Learners relate the functions of the parts to their positions on the plant. <p>B4.2.2.1.2. Examine some common seeds and how they germinate</p> <ul style="list-style-type: none"> • Review learner’s knowledge that seeds can germinate with or without soil. • This activity will take some days. <p>NB: It is a repeat of the B3 activity but this time, the focus is on the process of germination.</p> <ul style="list-style-type: none"> • Learners will work with beans or maize seeds. Learners first observe the dry seed coat, then when it absorbs water to swell rupturing of seed coat, sprouting of the root, sprouting of the stem and seed leaves, the elongation of the root and stem. • Learners follow the process and write reports. <p>NB: Report should include diagrams of each stage of germination.</p>	<p>Core Competencies Creativity and innovation Personal development and leadership Communication and Collaboration Critical Thinking and Problem-Solving</p> <p>Subject Specific Practices Observing, Classifying Analysing Evaluating Generalising</p> <p>Core Competencies Personal development and leadership Communication and Collaboration Critical Thinking and Problem-Solving Creativity and Innovation</p> <p>Subject Specific Practices Manipulating, Observing, Analysing, Evaluating, Recording</p>

STRAND 3: SYSTEMS

SUB-STRAND 1: THE HUMAN BODY SYSTEMS		
CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
B4.3.1.1 Recognise that different parts of the human body work interdependently to perform a specific function	<p>B4.3.1.1.1 Know the organs of the digestive system and their functions</p> <ul style="list-style-type: none"> • Show videos, pictures and models of the digestive system. • Learners keenly observe the organs of the digestive system. • Explain to learners the functions of the various organs in the digestive system. • Draw a diagram of the digestive system and cut out the various parts of the system into flash cards. • Learners randomly pick the parts of the digestive system on flashcards. • Learners build the digestive system by arranging the parts in an orderly manner as they appear in the digestive system. • Engage learners in an activity to role-play the various parts of the digestive system and their functions, with the aid of flashcards. 	<p>Core Competencies Digital Literacy Creativity and innovation Personal development and leadership Communication and Collaboration. Critical Thinking and Problem-Solving</p> <p>Subject Specific Practices Observing Manipulating Analysing Generating Communicating</p>
SUB-STRAND 2: THE SOLAR SYSTEM		
B4.3.2.1 Show an understanding of the orderliness of the sun, planets and satellites in the solar system, as well as the important role of the sun in the existence of the solar system	<p>B4.3.2.1.1 Explain that the sun is at the centre of the solar system</p> <ul style="list-style-type: none"> • Present learners with a chart, model or video showing the solar system. • Draw the solar system, using different colours to illustrate the different bodies. • Guide learners to role-play the stars, planets and satellites in the solar system (different learners assume and role-play the sun, the earth and other planets in the solar system). • Present the chart of the solar system and help learners identify the sun as being at the centre of the solar system. • Learners are guided to identify the benefits of the sun to the solar system. <p><i>Project: Learners mould stars, planets and satellites in the solar system.</i></p>	<p>Core Competencies Communication and Collaboration Personal Development and Leadership Critical Thinking and Problem-Solving Creativity and Innovation</p> <p>Subject Specific Practices Designing Experiment Planning Observing Recording Analysing</p>

SUB-STRAND 3: ECOSYSTEM

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
<p>B4.3.3.1 Show understanding and appreciation of the interactions and interdependencies of organisms in an ecosystem</p>	<p>B4.3.3.1.1 Explain the concept of ecosystem</p> <ul style="list-style-type: none"> • Learners role-play a typical family setup, showing how everyone is interdependent. • Learners identify the role of each member of their family, e.g. father, mother, siblings. The key lesson is to understand that everybody in the group is important and depend on one another. • Teacher mentions a habitat and the learners mention which plants, animals, and other organisms live there (Use games). • Show pictures and videos of forest settings having trees, grass, a stream, soil, fishes, rodents, frogs, etc. to explain to learners what an ecosystem looks like. • Learners discuss the importance of every element/member of a given ecosystem, e.g. frogs, weeds, soil and fish in a pond. • Brainstorm with learners to come out with responses to what happens when a member of the system is removed. • Assist learners to realise that it causes imbalance in the ecosystem. Relate the concept to everyday life, e.g. the destruction of the forest through galamsey and the felling of trees bring about imbalances in the environment. • Learners cite examples of ecosystems in their community and suggest ways of preserving them. 	<p>Core Competencies Cultural identity and Global Citizenship Personal development and leadership Critical Thinking and Problem-Solving Creativity and Innovation</p> <p>Subject Specific Practices Observing Manipulating Predicting Analysing Generalising Communicating</p>

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

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
<p>B4.4.1.1 Demonstrate understanding of the concept of energy, its various forms, sources and how to transform and conserve it</p>	<p>B4.4.1.1.1 Identify the effect of heat on the change of state of substances</p> <ul style="list-style-type: none"> • Guide learners through simple activities to identify effects of heat on substances (use liquids and solids, e.g. water, shea butter, candles, etc.). • Learners demonstrate evaporation by boiling water and discuss their experiences. <p>Note: let learners measure the quantity of the water before and after boiling to show the effect of heat on water.</p> <ul style="list-style-type: none"> • Elaborate on learners' ideas to explain how the escaping vapour can be changed into water (through the loss of heat). 	<p>Core Competencies Personal development and leadership Communication and Collaboration. Critical Thinking and Problem-Solving</p> <p>Subject Specific Practices Observing Manipulating Analysing Recording Measuring Communicating</p>
	<p>SUB-STRAND 2: ELECTRICITY AND ELECTRONICS</p>	
<p>B4.4.2.1 Demonstrate knowledge of generation of electricity, its transmission and transformation into other forms</p>	<p>B4.4.2.1.1 Identify the uses of electricity</p> <ul style="list-style-type: none"> • Begin by asking learners what they use to iron their school uniforms. • Use simple activities to demonstrate uses of electricity, (e.g. providing light, powering TVs, mobile phones, cooking, heating water, etc.) • Learners draw things in the home and at school that use electricity. <p>Project: <i>Electricity Generation</i> <i>Learners, in groups, generate electricity from fruit cells (orange, lime, tomatoes, potatoes and apple) and fuel cells, e.g. water.</i></p>	<p>Core Competencies Digital Literacy Creativity and innovation Personal development and leadership Communication and Collaboration. Critical Thinking and Problem-Solving</p> <p>Subject Specific Practices Analysing Generalising Communicating Manipulating Recording</p>

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
<p>B4.4.2.1 Demonstrate knowledge of generation of electricity, its transmission and transformation into other forms</p>	<p>B4.4.2.1.2 Describe ways of conserving electricity</p> <ul style="list-style-type: none"> • Learners explain why their parents put off the lights, television and other electrical appliances when leaving the house in the morning. • 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. • Based on their responses, facilitate a discussion on ways of conserving electricity. • Learners present their ideas to class for discussion. <p>Project: <i>Monitoring electricity consumption in the home and at school.</i> <i>Learners record the amount of electricity consumed in their homes or at school over a period of three (3) months and report on their findings.</i></p>	<p>Core Competencies Personal Development and leadership Cultural identity and Global Citizenship Communication and Collaboration. Critical Thinking and Problem-Solving</p> <p>Subject Specific Practices Observing; Analysing; Evaluating Generalising, Communicating Interpreting, Measuring Generalising, Recording</p>
<p>B4.4.2.2 Know the functions and assemblage of basic electronics components</p>	<p>B4.4.2.2.1 Identify the basic components of electronic circuits</p> <ul style="list-style-type: none"> • Learners are put into groups and each group is provided with connecting wires, batteries (dry cells), switches and LEDs (of different colours). • Learners are assisted to identify the various components provided. • Learners observe a demonstration on how to connect the components to light the LED. • Learners are guided to connect the components to make the LED produce light. • Engage learners to discuss the use of each component • Learners draw the circuits they have connected. • Learners suggest other materials that can be used in the absence of the connecting wire. • Learners act as electrons flowing in a circuit through the classroom. Learners act out the role of various components (resistor, capacitor, etc) in the circuit. <p>NB: Build a stock of electronic components from discarded electronic gadgets such as radio and TV sets.</p>	<p>Core Competencies Digital Literacy Personal development and leadership Communication and Collaboration. Critical Thinking and Problem-Solving Creativity and Innovation</p> <p>Subject Specific Practices Observing Manipulating Analysing Generalising Communicating</p>

SUB-STRAND 3: FORCES AND MOVEMENT

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
<p>B4.4.3.1 Know that movement is caused by applied forces due to the release of stored energy</p>	<p>B4.4.3.1.1 Demonstrate understanding of elastic and compressional forces and their everyday applications</p> <ul style="list-style-type: none"> • Learners bring catapults, rubber bands, springs and bicycle pumps to class. • Guide learners to demonstrate different effects of forces, e.g. by kicking a ball in different directions, pushing a table, crumpling a piece of paper or stopping a moving toy. • Engage learners in activities to demonstrate elastic and compression forces using the materials brought to class. • Learners to discuss how elastic and compressional forces are applied in everyday life. 	<p>Core Competencies Cultural identity and Global Citizenship Personal development and leadership Communication and Collaboration. Critical Thinking and Problem-Solving</p> <p>Subject Specific Practices Observing Manipulating Predicting Analysing Generalising Communicating</p>

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

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
<p>B4.5.1.1 Recognise the importance of personal hygiene</p>	<p>B4. 5.1.1.1 Know how to care for one’s self and the environment</p> <ul style="list-style-type: none"> • Learners brainstorm in groups and share ideas with the whole class on what they do to maintain personal hygiene. • Learners write their ideas on flashcards (ideas may include bathing twice daily, cleaning the teeth, cutting their finger nails, washing their towels, sweeping their classrooms, etc.). • Brainstorm with learners on what will happen if they do not take good care of their bodies. • Learners are assigned to investigate materials that can be used to enhance personal hygiene (to brush the teeth, clean the armpit or bath). <p>B4. 5.1.1.2 Describe ways of sustaining the environment through waste management</p> <ul style="list-style-type: none"> • Learners watch pictures and videos on how to sustain the environment, including separating waste. • Engage learners in groups to mention the types of waste they produce in the home and at school, e.g. paper, rubber, bottles, etc. • Write learners’ ideas on the board and let them brainstorm on what will happen if the wastes they produce are not separated. • Evaluate learners by asking them to perform individual tasks, e.g. by writing down four practical ways of sustaining the environment. <p>Project: <i>Design Litterbins to hold different forms of waste. Learners make or mould litterbins and other equipment from suitable materials for holding different types of waste.</i></p>	<p>Core Competencies Critical thinking and Problem-Solving Collaboration and communication. Personal Development and Leadership</p> <p>Subject Specific Practices Analysing Predicting Evaluating</p> <p>Core Competencies Digital Literacy Creativity and innovation Personal development and leadership Communication and Collaboration Critical Thinking and Problem-Solving</p> <p>Subject Specific Practices Observing, Designing experiment, Analysing, Generalising Generating</p>

SUB-STRAND 2: DISEASES

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
<p>B4.5.2.1 Know common diseases of humans; causes, symptoms, effects and prevention</p>	<p>B4.5.2.1.1 Identify causes, symptoms and prevention of measles</p> <ul style="list-style-type: none"> • Learners watch pictures, videos or charts on causes, symptoms and prevention of measles or invite a health personnel or School Health Education Programme (SHEP) coordinator to give a talk on measles. • In pairs, learners answer the following questions based on the pictures and videos: (1) What causes measles? (2) What are the symptoms of measles? (3) What should be done if someone is exposed to measles? (4) What are the ways of preventing the spread of measles? <p>Project: Learners develop concept maps to show the causes, symptoms and prevention of measles. Learners develop posters to talk about how they can prevent measles.</p> <p>B4.5.2.1.2. Demonstrate understanding of the causes, symptoms and prevention of food-borne diseases</p> <ul style="list-style-type: none"> • Learners watch pictures and videos on causes, symptoms and prevention of food borne diseases. • Invite a health personnel, SHEP coordinator or personnel from the Food and Drugs Authority (FDA) to give a talk on food-borne diseases. • In pairs, let learners respond to the following questions: (1). What causes food-borne diseases? (2). What are the symptoms of food-borne diseases? (3). What should be done if someone contracts a food-borne disease? • In pairs, learners give examples of food-borne diseases in their localities, i.e. cholera, diarrhoea, typhoid fever, etc. • Learners predict what will happen when someone contracts a food-borne disease. • Evaluate learners by asking them to prepare posters on the prevention and control of food-borne. 	<p>Core Competencies Critical thinking and Problem-Solving Collaboration and communication. Personal Development and Leadership Digital literacy</p> <p>Subject Specific Practices Analysing Predicting Evaluating</p> <p>Core Competencies Critical thinking and Problem-Solving Collaboration and communication. Personal Development and Leadership Digital literacy</p> <p>Subject Specific Practices Observing Evaluating Generating Analysing</p>

SUB-STRAND 4: CLIMATE CHANGE

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
<p>B4.5.4.1 Know that climate change is one of the most important environmental issues facing the world today</p>	<p>B4.5.4.1.1 Explain that burning is one of the causes of climate change</p> <ul style="list-style-type: none"> • Learners watch pictures and videos or charts showing burning of fossil fuel and changing weather pattern. • Narrate to learners a story of a bush fire and the effect it has on humans, plants, animals and property. • Learners, in groups discuss what happens when burning occurs. • Learners present their ideas, i.e. burning brings out smoke, makes air dirty or unclean, etc. • Brainstorm with learners on what will happen if there is continuous burning of vegetation and waste. • Evaluate learners by asking them to design posters on the effect of burning on climate change. 	<p>Core Competencies Critical thinking and Problem-Solving Collaboration and communication. Personal Development and Leadership Creativity and Innovation</p> <p>Subject Specific Practices Observing Predicting Evaluating Analysing Generalising</p>

BASIC 5

BASIC 5
STRAND 1: DIVERSITY OF MATTER

SUB-STRAND 1: LIVING AND NON-LIVING THINGS

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
<p>B5.1.1.1 Understand the physical features and life processes of living things and use this understanding to classify them</p>	<p>B5.1.1.1.1 Know the life processes of living things (growth, sensitivity to the environment, respiration and excretion)</p> <ul style="list-style-type: none"> • Learners go outside the classroom to observe and identify various living and non-living things and discuss their observation. • Engage learners to watch pictures or animated videos of different living things (e.g. birds, insects, trees, reptiles, mammals, etc.) and comment on them. • Ask learners to identify the names of the living things from the video. • Use relevant examples and illustrations to demonstrate or explain sensitivity, respiration and excretion as life processes. • Learners go on a nature walk to observe sensitivity in the mimosa plant when touched. • Assist learners to understand growth by observing a seedling and a mature plant of the same kind. • Let learners breathe air in and out to demonstrate respiration. <p>NB: Plants show movement within their parts and animals move from place to place. Project: <i>Learners plant a seed and observe its growth pattern.</i></p>	<p>Core Competencies Digital Literacy Creativity and innovation Personal development and leadership Communication and Collaboration. Critical Thinking and Problem-Solving</p> <p>Subject Specific Practices Observing Analysing Generalising Evaluating</p>
<p>B5.1.1.2 Demonstrate understanding of the differences between living things, non-living things, and things which have never been alive</p>	<p>B5.1.1.2.1 Compare the differences among things that are living, dead and things that have never been alive</p> <ul style="list-style-type: none"> • Assemble living things (e.g. plants, insects, etc.), non-living things (e.g. firewood, pencils, paper, etc.) and things that have never lived (rocks, soil, water, etc.) for class activities. <p>NB: Wear protectives when gathering specimen.</p> <ul style="list-style-type: none"> • Learners observe and comment on the samples. • Learners, in an activity, classify the provided specimen as (1) Things that are alive (2) Once alive or (3) Never been alive. Learners are guided to compare the differences among things that are alive, once alive or never been alive. • Learners explain why they (learners) are classified as living things. 	<p>Core Competencies Digital Literacy Creativity and innovation Personal development and leadership Communication and Collaboration Critical Thinking and Problem-Solving</p> <p>Subject Specific Practices Observing, Analysing, Generalising, Evaluating</p>

SUB-STRAND 2: MATERIALS

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
<p>B5.1.2.1 Recognise materials as important resources for providing human needs</p>	<p>B5.1.2.1.1 Classify everyday materials based on their properties (soft, hard, rough, smooth, opaque, transparent and bendable)</p> <ul style="list-style-type: none"> • Learners are asked to collect and bring a variety of everyday materials from the home, school and community. Examples should include cotton wool, pieces of cloth, pieces of paper, cardboard, wood, plastics, polythene bags (coloured and transparent), soil samples, marbles (rough and smooth) chalk, crayon, pen and straw. • Learners are assisted to sort and group the materials based on texture (hard or soft), and size (big or small). • Demonstrate by assisting learners to group materials into those that we can see through (transparent) and those that we cannot see through (opaque). • Learners sort the materials into those that can bend and those that cannot bend. • Learners feel and draw materials that are hard, soft, smooth, etc. • Learners are tasked to display their drawings in class for discussion. • Learners are assisted to know that the properties of a given material enable it to be used for making certain products, e.g. clay is used for making pots because it can be moulded without breaking. raffia palm is used in basketry because it can bend easily. • Learners work in groups to classify different materials based on various similarities and differences. <p>Project: <i>Learners use different materials to create new items such as paper fans, toy cars, toy planes, cooking pans, hats and earthenware pots and bowls and exhibit their work.</i></p>	<p>Core Competencies Communication and Collaboration Creativity and innovation Personal development and leadership Critical Thinking and Problem-Solving</p> <p>Subject Specific Practices Observing Manipulating Analysing Evaluating Generalising Classifying</p>
<p>B5.1.2.2 Know that substances can exist in different physical states (solid, liquid, gas). Many substances can be changed from one state to another by heating or cooling</p>	<p>B5.1.2.2.1 Know that some changes are reversible, while others cannot be reversed</p> <ul style="list-style-type: none"> • Provide substances such as candle wax, shea butter, water, paper and a source of heat. • In groups learners undertake the following activities (e.g. melting of candle wax, melting of ice, melting of shea butter, heating of water, crumpling of paper, melting of plastics, burning of paper, burning of wood, etc.). • Learners, in their groups, talk about their observations. • Assist learners to classify the activities as (1) lead to the formation of a new thing, (2) no new thing formed. • Assist learners to understand that changes where no new thing is formed are reversible, while changes where new things are formed are usually not reversible. <p>NB: Hazardous chemicals and solutions should not be used.</p>	<p>Core Competencies Personal development and leadership Communication and Collaboration.</p> <p>Subject Specific Practices Observing Manipulating Analysing Generalising Classifying</p>

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
<p>B5.1.2.3 Understand mixtures, the types, formation, uses and ways of separating them into their components</p>	<p>B5.1.2.3.1 Demonstrate formation and separation of mixtures (solid-liquid and liquid-liquid mixtures)</p> <ul style="list-style-type: none"> • Display some solid and liquid substances for learners to observe, e.g. water, common salt, vinegar, sugar, sand, cooking oil and soft drinks. • Put learners in groups and ask them to add each of the substances to a separate quantity of water whilst stirring and observe what happens. • Learners describe the material combinations they have produced, i.e. as solid-liquid mixture, liquid-liquid mixture or a solution. • Learners find out the difference between a mixture of sand and water and a mixture of salt and water. • Learners also differentiate between the mixture of water and soft drink and the mixture of water and cooking oil. • Put learners into groups to demonstrate how to recover the salt from the salt solution. • Assist learners to separate different solid-liquid mixtures and liquid-liquid mixtures using separation methods such as filtration, evaporation, sieving and use of separating funnel. <p>Project: <i>Separation of solid- liquid mixture</i> <i>Learners separate a mixture of sand and water using appropriate materials.</i></p> <p>NB: Improvised separation equipment can be used to effectively separate various mixtures</p>	<p>Core Competencies Personal development and leadership Communication and Collaboration Critical Thinking and Problem-Solving</p> <p>Subject Specific Practices Observing Manipulating Analysing Generating Reporting</p>

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
B5.2.1.3 Show understanding of the roles of condensation, evaporation, transpiration and precipitation in the hydrological (water) cycle CONT'D	B5.2.1.3.2 Know how clouds are formed <ul style="list-style-type: none"> • Review composition of air with learners. This should include water vapour. • Ask learners the question: what are clouds? And assists learners to come out with this explanation: clouds consist of many tiny water droplets resulting from the condensation of water vapour into liquid water or ice. • Explain that upward vertical motion of air through the atmosphere cools water vapour to form clouds. • Learners demonstrate formation of clouds in a bottle. • Learners explain why clouds are not formed close to the surface of the ground. 	Core Competencies Creativity and innovation Personal development and leadership Communication and Collaboration. Critical Thinking and Problem-Solving Subject Specific Practices Manipulating, Analysing Evaluating, Communicating
B5.2.1.4 Demonstrate understanding of how carbon and nitrogen are cycled in nature	B5.2.1.4.1 Describe the uses of carbon dioxide and its effects on humans and life on earth <ul style="list-style-type: none"> • Learners mention the components of air (this should include carbon dioxide). • Learners are assisted in groups to answer the following questions: What is carbon dioxide? What is carbon dioxide used for? How does carbon dioxide get into the environment? Does carbon dioxide have adverse health effects? Does carbon dioxide have adverse effects on the environment? • Learners are assisted to identify some common uses of carbon dioxide such as for making fire extinguishers, fizzy drinks and for the process of food preparation in plants. 	Core Competencies Personal development and leadership Communication and Collaboration. Critical Thinking and Problem-Solving Subject Specific Practices Analysing Evaluating Communication
B5.2.1.5 Recognise water and air as important natural resources	B5.2.1.5.1 Identify human activities that make water unsuitable for human use <ul style="list-style-type: none"> • Begin by discussing the qualities of good drinking water and dangers of using unsafe water. • Learners, in groups, identify human activities that make water unsuitable for use, e.g. toxic waste disposal, sewage disposal, deforestation, mining, littering, pesticides, herbicides and fertilizer application and agricultural practices. • Learners brainstorm to come out with ways of preventing, minimizing and controlling water pollution. <p>Project: Task learners to work in groups to create concept maps on the causes, control and prevention of water pollution.</p>	Core Competencies Critical Thinking and Problem-Solving Cultural Identity and Global Citizenship Personal development and leadership Communication and Collaboration Creativity and Innovation Subject Specific Practices Analysing, Predicting, Analysing Evaluating, Communicating

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
B5.2.1.5 Recognise water and air as important natural resources	<p>B5.2.1.5.2 Know how to make and keep air clean in our environment</p> <ul style="list-style-type: none"> Find out from learners what they understand by clean air and review things that pollute air (make air unclean) such as smoke from factories, car exhausts, bush burning and dust from construction sites and untarred roads. Lead discussions to come out with the do's and don'ts that will make or keep air clean in our homes and surrounding environment (planting of trees and grass and avoiding frequent and uncontrolled burning). Learners are assigned to design a concept map on the causes, prevention and control of air pollution. Learners draw and use a Future's Wheel to trace the effects of water pollution on the environment. 	<p>Core Competencies Critical Thinking and Problem-Solving Cultural Identity and Global Citizenship Personal development and leadership Communication and Collaboration Creativity and Innovation</p> <p>Subject Specific Practices Analysing, Predicting, Analysing Evaluating, Communicating</p>
	SUB-STRAND 2: LIFE CYCLES OF ORGANISMS	
B5.2.2.1 Demonstrate understanding of life cycle of a plant	<p>B5.2.2.1.1 Relate structure of the parts of a plant (leaves, stem, root, flower) to the functions they perform</p> <ul style="list-style-type: none"> Discuss functions of parts of plants with learners. Learners go on a nature walk to uproot young plants from school surroundings and bring them to class. Learners, in groups, observe parts of the plants and relate them to the functions they perform, e.g. the thin and large surface area of leaves and the presence of green colouring matter enhance their work. The roots are for anchorage and absorption of nutrients from the soil. The stem supports the upper part of the plant; conduct water and minerals from the roots to the leaves; carry food from leaves to other parts of the plant. Learners draw and colour a plant and label the parts. 	<p>Core Competencies Personal development and leadership Communication and Collaboration. Critical Thinking and Problem-Solving</p> <p>Subject Specific Practices Observing Manipulating Analysing Evaluating Generalising</p>
	<p>B5.2. 2.1.2 Compare the differences in germination of bean and maize seeds</p> <ul style="list-style-type: none"> Learners are assisted to review the previous knowledge on seed germination. Put learners in groups and provide them with dry beans and maize seeds. Learners are assisted to plant the bean and maize seeds using transparent containers and soil. Learners are guided to observe (1) the dry seed (2) when it absorbs water and swells (3) rupturing of the seed coat (4) sprouting of the root (5) sprouting of the stem and seed leaves (6) the elongation of the root and stem. Learners find out where the seed leaves (cotyledons) remain, inside the soil or above the soil. <p>NB: This activity will take some days.</p>	<p>Core Competencies Personal Development and leadership Communication and Collaboration. Critical Thinking and Problem-Solving</p> <p>Subject Specific Practices Observing, Manipulating, Analysing, Classifying, Generalising</p>

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

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
<p>B5.3.1.1 Recognise that different parts of the human body work interdependently to perform a specific function</p>	<p>B5.3.1.1.1 Know the parts of the respiratory system in humans</p> <ul style="list-style-type: none"> • Introduce the lesson with songs on the parts of the body, e.g. <i>head, shoulders, knees and toes</i>. • Ask learners to breathe in and out for some time. • Relate the act of breathing to the respiratory system and guide learners to identify the organs of the system using charts or models. • Use role-play to guide learners to identify the functions of each part (different learners assume and role-play the functions of parts of the respiratory system, e.g. Ama is the lungs and Amina is the diaphragm). • Engage learners in an activity to design a breathing model using plastic bags, balloons, rubber bands and polythene bags. • Learners draw and label the respiratory system and state its function. • Learners are tasked to find out the diseases and lifestyles that affect the respiratory system adversely. <p>Project: Assist learners to design an improvised breathing apparatus using plastics.</p>	<p>Core Competencies Digital Literacy Personal development and leadership Communication and Collaboration. Critical Thinking and Problem-Solving Creativity and Innovation</p> <p>Subject Specific Practices Observing Analysing Classifying Communicating Designing Interpreting</p>
SUB-STRAND 2: THE SOLAR SYSTEM		
<p>B5.3.2.1 Show understanding of the orderliness of the sun, planets and satellites in the solar system, as well as the important role of the sun in the existence of the solar system</p>	<p>B5.3.2.1.1 Identify the components of the solar system (sun, earth, moon, other planets, satellite)</p> <ul style="list-style-type: none"> • Present learners with a chart, model or video depicting the solar system or draw the solar system on the board, using different colours to illustrate the different bodies. • Learners recite the poem, “I see the moon, and the moon sees me”. • Initiate a discussion on the importance of the sun to life on earth. • Explain to the learners that the earth orbits (moves around) the sun, leading to changes in seasons (it takes a year for the earth to move around the sun). • Learners are made to understand that heavenly bodies that move around the sun are called planets. • Learners observe the planet Venus, the brightest object in the sky before sunset or several hours after sunrise. • Learners are guided to role- play the sun and the planets in the solar system. • Share folktales about the sun and moon with learners. 	<p>Core Competencies Digital Literacy Personal development and leadership Communication and Collaboration.</p>

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
<p>B5.3.2.1 Show understanding of the orderliness of the sun, planets and satellites in the solar system, as well as the important role of the sun in the existence of the solar system CONT'D</p>	<ul style="list-style-type: none"> • Learners should understand that all the planets move around the sun. • Learners to observe the planet Venus, the brightest object in the sky before sunset or several hours after sunrise. <p>Project: <i>Planning, designing and making a model of the Solar System</i> Learners build a model of the solar system using suitable materials such as blu tack, clay, cardboard and wood. etc.</p>	
<p>SUB-STRAND 3: ECOSYSTEM</p>		
<p>B5.3.3.1 Show understanding of ecosystem, interdependency of organisms in an ecosystem and appreciate the interactions</p>	<p>B5.3.3.1.1 Know how various organisms are adapted to survive in their habitat</p> <ul style="list-style-type: none"> • Begin the lesson with a matching activity using flashcards (write the names of different organisms on flashcards and a list of habitats on another set of flashcards for learners to match with). • Learners explain why a bird cannot live in water. • Learners discuss various habitats of animals and plants. • Brainstorm with learners to come out with the meaning of the term habitat. • Learners are asked to give examples of animals that live in water, land and trees. • Learners are assisted to discuss how various organisms adapt to their habitat, e.g. what enables fish to live in rivers, birds to live on trees? <p>Project: <i>Designing a habitat</i> Learners plan, design and make a model of a habitat using card board, paper, blu tack and clay to show the homes of some animals.</p>	<p>Core Competencies Critical Thinking and Problem-Solving Personal development and leadership Communication and Collaboration</p> <p>Subject Specific Practices Analysing Evaluating Generalising Designing Interpreting</p>

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

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
<p>B5.4.1.1 Demonstrate understanding of the concept of energy, its various forms and sources and the ways in which it can be transformed and conserved</p>	<p>B5.4.1.1.1 Explain how energy is transformed from one form to another</p> <ul style="list-style-type: none"> • Explore learners' previous knowledge on the forms of energy (e.g. Electrical, heat, light, sound). • Use some common devices (e.g. torch, radio, television, etc.) to demonstrate transformation of energy. • Learners discuss energy transformations that take place in the school, e.g. ringing of bell, beating of gong-gong, drumming, etc. • In groups, learner's identify other forms of energy transformations in the school community and present their findings for discussion in the class. • Learners design a flow chart to explain how energy from the sun is transformed into energy for walking. <p>B5.4.1.1.2 Know how to use electricity efficiently in the home</p> <ul style="list-style-type: none"> • Learners mention names of things that use electricity in the home. • Brainstorm with learners to come out with how they use the electrical gadgets. • Learners talk about what will happen if electrical gadgets are not switched off when not in use. • Elaborate on and link learners' ideas with the issue of power outages and crisis which come as a result of the efficient use of electricity in our homes and industries. • Learners, in a think-pair-share activity, identify how they can use electricity efficiently in the home, community and school. e.g. ironing in bulk, putting off television sets and freezers when ironing, using energy-efficient bulbs and other electrical gadgets with higher energy efficient ratings: (more stars imply higher energy efficiency). 	<p>Core Competencies Personal development and leadership Communication and Collaboration. Critical Thinking and Problem-Solving</p> <p>Subject Specific Practices Observing, Manipulating, Analysing, Evaluating, Classifying, Designing and Interpreting</p> <p>Core Competencies Critical Thinking and Problem-Solving Cultural identity and global citizenship. Personal development and leadership Communication and Collaboration.</p> <p>Subject Specific Practices Analysing, Evaluating Manipulating</p>

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
<p>B5.4.1.2 Show understanding of the concept of heat energy in terms of its importance, effects, sources and transfer from one medium to another</p>	<p>B5.4.1.2.1 Show the relationship between heat and temperature</p> <ul style="list-style-type: none"> • Review previous lesson on temperature with learners. • In a group discussion, learners find out what will happen when heat is applied to a substance or lost from a substance, e.g. when a substance is placed in the sun for a while or when a substance is put in a fridge. • Learners undertake an activity of placing objects such as metal plates, pieces of stone in the sun. • Learners initially touch the objects to feel their degree of warmth before they are put in the sun. • After 20 minutes, learners touch the objects again and feel the difference in temperature. • Learners should then place the stones or metals in a bowl of water and afterwards, touch again to determine whether they become hotter or colder. • Elaborate on learners' ideas, emphasising heat as the factor that changes temperature. • Summarise lesson by explaining to learners that when heat is lost, temperature reduces, when heat is gained, temperature increases. <p>B1.4.1.2.2 Measure and record temperature using thermometer</p> <ul style="list-style-type: none"> • Guide learners, in groups, to produce their own improvised thermometers using plastic bottles, plastic straws, dyes and water. • If available, bring clinical and laboratory thermometers to class. • Learners recall their previous knowledge on the concept, "temperature". • Learners discuss the relationship between hotness and coldness in terms of heat transfer, (when an object loses heat, it cools and when it gains heat, it becomes warm or hot). • Learners identify the instrument used for measuring the amount of heat in a body and give examples of places where the thermometer is used. • Learners are assisted to use the clinical thermometer to measure and record their body temperatures and the laboratory thermometer to measure the temperature of warm water. 	<p>Core Competencies Personal development and leadership Communication and Collaboration</p> <p>Subject Specific Practices Observing Manipulating Analysing Generalising</p> <p>Core Competencies Critical Thinking and Problem-Solving Personal development and leadership Communication and Collaboration</p> <p>Subject Specific Practices Analysing Evaluating Classifying Observing Recording Manipulating</p>

SUB-STRAND 2: ELECTRICITY AND ELECTRONICS

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
<p>B5.4.2.1 Demonstrate knowledge of generation of electricity, its transmission and transformation into other forms</p>	<p>B5.4.2.1.1 Identify the components of an electric circuit and their functions</p> <ul style="list-style-type: none"> • Begin by asking learners what comes into their minds when they hear the term, 'electric circuit' • Learners watch pictures and videos of simple electrical circuits and how they work. • Learners, in groups, construct simple electric circuits using connecting wire, dry cells and a bulb/LED to light up the bulb. • Assist learners to identify the components and their uses. • Learners find out other materials that can be used in place of dry cells, connecting wires and bulb. <p>Project: Learners build an LED lantern using the above circuit and plastic bottle.</p>	<p>Core Competencies Creativity and innovation Personal development and leadership Communication and Collaboration</p> <p>Subject Specific Practices Observing Manipulating Analysing Evaluating Communicating</p>

SUB STRAND 3: FORCES AND MOVEMENT

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
<p>B5.4.3.1 Know that movement is caused by applied forces due to the release of stored energy</p>	<p>B5.4.3.1.1 Explain the term, “friction”, its effects and applications</p> <ul style="list-style-type: none"> • Review the previous lesson on forces with learners. • Learners recall some examples of forces and their effects/applications. • Learners explain why cars usually drive slowly on wet roads. • Task them to explain what happens when one accidentally step into an oil spill on the floor. • Ask learners these questions: What is friction? What does it do? How does it work? • Then discuss their prior knowledge of the topic. • Learners rub their palms together for several sections and talk about what they notice. • Explain to learners that the warmth they feel is caused by a force called friction and that friction is the force that opposes the movement of two surfaces against each other. • Some learners remove their shoes to show the shrunken heels/soles as an example of the effect of friction between the sole of the shoe and the ground which one walks on. • Emphasise the fact that it is because of the friction between the shoes and the ground that we do not fall whilst walking or running. • Explain to learners again that on a rainy day or on a smooth/polished surface, friction is reduced, which means the shoes of the one walking or the tyres of the car are not firmly gripped to the ground or the road because friction has reduced. Thus, this is what causes people to fall or slip on oily or wet surfaces. <p>Project: <i>Investigating the effect of friction</i> Learners demonstrate the effect of friction by using a toy car on rough and smooth surfaces.</p>	<p>Core Competencies Creativity and innovation Personal development and leadership Communication and Collaboration. Critical Thinking and Problem-Solving</p> <p>Subject Specific Practices Observing Manipulating Predicting Analysing Evaluating Generalising Communicating Designing</p>

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

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
<p>B5.5.1.1 Recognise the importance of personal hygiene</p>	<p>B5.5.1.1.1 Know why it is important to wash clothes regularly</p> <ul style="list-style-type: none"> • Engage learners in groups to discuss among themselves what items are needed to wash their clothes and underwear. • Groups present their ideas to the whole class. • Present to learners, real items (soap, water, dirty clothes, etc.) needed to wash clothes and underwear and demonstrate how washing is done. • Learners demonstrate how washing is done (a learner from each group). • Engage learners to watch a video or pictures showing other methods of washing clothes and underwear, apart from the hands. • In pairs, learners share ideas on what will happen if they don't wash their clothes and underwear regularly. • Guide learners to design personal roster for washing their clothes, indicating the days and times which they will use to wash their dirty clothes. 	<p>Core Competencies Critical thinking and Problem-Solving Collaboration and communication. Personal Development and Leadership Digital literacy Creativity and Innovation</p> <p>Subject Specific Practices Observing Manipulating Analysing Evaluating Designing Creating</p>
<p>B5.5.1.2 Identify, discuss and appreciate the natural and human features of the environment and the need to keep the environment clean</p>	<p>B5.5.1.2.1 Know how to keep washrooms clean</p> <ul style="list-style-type: none"> • Learners watch pictures and videos on how to keep washrooms clean. • Engage them in a discussion on how to keep the lavatory clean. • Emphasise such key points as: flushing immediately after use, urinating directly in the toilet bowl, keeping used tissues in waste containers rather than throwing them on the floor, regularly removing used tissues and burning them. • Learners investigate the risks associated with the use of dirty washrooms. • Evaluate learners by asking them to design a poster to be pasted in their school's washroom. 	<p>Core Competencies Critical thinking and Problem-Solving Collaboration and Communication. Personal Development and Leadership Digital literacy</p> <p>Subject Specific Practices Observing Analysing Evaluating</p>

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
<p>B5.5.1.2 Identify, discuss and appreciate the natural and human features of the environment and the need to keep the environment clean</p>	<p>B5.5.1.2.2 Demonstrate how to clean the environment regularly</p> <ul style="list-style-type: none"> • Assemble various items for cleaning the environment. • Begin the lesson with a song on cleanliness. • Take the learners on a trip to observe tidy and untidy parts of the nearby community or show different pictures depicting clean and unclean environments. • Engage learners to discuss how to make the unclean environments as clean as those that are clean. • Learners discuss some materials that are used for cleaning the home, the school and the community. • Demonstrate to learners the correct way of using the cleaning tools, e.g. brooms, rags, ceiling brush, dustpans and dustbins. • Learners are assisted to know the need to keep the environment clean. • Engage learners to use local cleaning tools to clean the classroom and the school environment. <p>Project: <i>Learners design posters to create awareness on the need to keep the school, home and Community clean and exhibit their work in the school.</i></p> <p>NB: Teachers are encouraged to form an environmental awareness club in the class after this lesson.</p>	<p>Core Competencies Critical thinking and Problem-Solving Cultural Identity and Global Citizenship Collaboration and communication. Personal Development and Leadership Creativity and Innovation</p> <p>Subject Specific Practices Observing, Manipulating, Analysing, Evaluating, Designing, Interpreting, Communicating</p>
	<p>SUB-STRAND 2: DISEASES</p>	
<p>B5.5.2.1 Know common diseases of humans; causes, symptoms, effects and prevention</p>	<p>B5.5.2.1.1 Explain the causes, symptoms and control of chicken pox</p> <ul style="list-style-type: none"> • Learners watch pictures, videos or charts on causes, symptoms and control of chicken pox or invite a health personnel or School Health Education Programme (SHEP) coordinator to give a talk on chicken pox. • In pairs, learners answer the following questions based on the pictures and video: (1) What causes chicken pox? (2) What are the symptoms of chicken pox? (3) What should be done if someone has chicken pox? (4) What are the ways of preventing the spread of chicken pox? <p>Project: <i>Learners develop a concept map to trace the causes, symptoms and prevention of chicken pox.</i></p>	<p>Core Competencies Critical thinking and Problem-Solving Collaboration and communication. Personal Development and Leadership Digital literacy</p> <p>Subject Specific Practices Analysing, Evaluating Designing, Interpreting</p>

SUB-STRAND 2: DISEASES

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
<p>B5.5.2.1 Know common diseases of humans; causes, symptoms, effects and prevention</p>	<p>B5.5.2.1.2 Identify causes, symptoms and prevention of cholera</p> <ul style="list-style-type: none"> • Learners watch pictures and videos or images showing the causes, symptoms and prevention of cholera. • Invite a local health officer or SHEP coordinator to give a presentation on cholera to the learners. • Engage learners, in groups, to discuss the causes of cholera, using everyday scenarios, e.g. eating contaminated food and living in a dirty environment. • Learners are provided one large cardboard for all the groups to write different ideas on the causes, prevention and symptoms of cholera. • Learners display the cardboard in the classroom. 	<p>Core Competencies Critical thinking and Problem-Solving Collaboration and communication. Personal Development and Leadership Digital literacy Subject Specific Practices Analysing Generating</p>
<p>SUB STRAND 3: SCIENCE AND INDUSTRY</p>		
<p>B5.5.3.1 Recognise the impact of science and technology in society</p>	<p>B5.5.3.1.1 Identify the raw materials used in some local industries (kenkey production, gari production, ceramic and pottery production)</p> <ul style="list-style-type: none"> • Take learners to a local gari, kenkey, shea butter, cooking oil, blacksmith, basketry, carpentry or pottery production site or show videos of such ventures. • Learners observe critically and identify the raw materials used in the various industries. • Engage the learners in a matching activity to match some local products with their raw materials. <p>Project: <i>Designing an Industry.</i> <i>Learners plan and design a factory in their locality, showing the raw materials they use and the finished products.</i></p>	<p>Core Competencies Critical thinking and Problem-Solving Collaboration and communication. Personal Development and Leadership Digital literacy Subject Specific Practices Observing Analysing Evaluating Planning Designing Interpreting</p>

SUB-STRAND 4: CLIMATE CHANGE

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
<p>B5.5.4.1 Know that climate change is one of the most important environmental issues facing the world today</p>	<p>B5.5.4.1.1 Identify the impact of deforestation on climate change</p> <ul style="list-style-type: none"> • Put learners into groups and let them discuss the importance of trees in the environment. • Take them on a trip around the school environs and help them to appreciate the importance of trees such as provision of shade, food, fresh air, production of rain, etc. • Learners brainstorm on what will happen if people continuously cut down trees. • Engage each group to present their ideas to the whole class and re-shape their ideas by writing all key points on tree-felling and its impact to the environment as well as its long-term effect on the climate. • Learners brainstorm on what measures to take to stop people from tree-cutting. • Learners are assisted to plant trees in their school environment and at strategic locations within the community. • Learners are supervised to take good care of the trees they plant. 	<p>Core Competencies Critical thinking and Problem-Solving Collaboration and communication Personal Development and Leadership Digital literacy</p> <p>Subject Specific Practices Observing Analysing Evaluating</p>

BASIC 6

BASIC 6

STRAND 1: DIVERSITY OF MATTER

SUB-STRAND 1: LIVING AND NON-LIVING THINGS

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
B6.1.1.1 Show understanding of the physical features and life processes of living things and use this understanding to classify them	<p>B6.1.1.1.1 Classify plants based on their root system</p> <ul style="list-style-type: none"> • Review previous lesson on parts of a plant with learners (stem, root, leaves and flowers). • Learners uproot young plants (e.g. grass, beans, mango, cassava and sweet potato) and bring to class. • Learners are shown pictures of the root systems of different plants. • Learners observe and identify the similarities and differences between the roots of the various plants. • Task learners to put the plants into two main groups based on the similarities in their roots system. • Learners give reasons for their classifications. • Build the vocabulary of learners by explaining to them the two main root systems of plants, namely; tap roots and fibrous roots. • Learners to mould tap root and fibrous root using blu tack and display for discussion. 	<p>Core Competencies Critical thinking and Problem-Solving Communication and Collaboration Creativity and Innovation</p> <p>Subject Specific Competencies Observing Communicating Planning Analysing Designing Interpreting</p>
SUB-STRAND 2: MATERIALS		
B6.1.2.1 Recognise materials as important resources for providing human needs	<p>B6.1.2.1.1 Know the general properties of metals such as lustre, malleability, conductivity and ductility</p> <ul style="list-style-type: none"> • Learners, in groups, gather different objects such as ruler, erasers, exercise books, comb, plastic bowls, connecting wires, cups, plates, cooking pans, roofing sheets, iron nails, pins, etc. • Learners classify the various materials as metals or non-metals based on the following properties: lustre, malleability, conductivity and ductility. • Learners give reasons for their classification. • Relate the lesson to everyday activities that involve the use of metals. • Given a piece of aluminium foil and a drinking straw, learners describe how they will use conductivity to classify them as metals or non-metals. • Learners design and make simple machines with metals. 	<p>Core Competencies Critical thinking and Problem-Solving Digital Literacy Communication & Collaboration</p> <p>Subject Specific Practices Observing Communicating Analysing Generalising</p>

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
<p>B6.1.2.1 Recognise materials as important resources for providing human needs</p> <p>CONT'D</p>	<p>B6.1.2.1.2 Investigate the uses of metals in everyday life and link the uses to their properties</p> <ul style="list-style-type: none"> • Display different objects made from metals. • Engage learners in groups to write names of the objects and present their answers in class. • Learners, through discussion, come out with uses of metals by observing the objects displayed in class or from a video (these include farm tools, jewellery, ornaments, cars, bridges, metallic spoons). • Link the use of the metal to its property, e.g. copper is used to make wires because it conducts electricity, aluminium is used to make roofing sheets because it is malleable. • Relate the lesson to everyday life to promote curiosity. 	
<p>B6.1.2.2 Understand mixtures, the types of formation, uses and ways of separating them into their components</p>	<p>B6.1.2.2.1 Examine some uses of mixtures in everyday life</p> <ul style="list-style-type: none"> • Review previous lesson on mixtures with learners. • Learners watch videos and pictures of different types of mixtures. • Provide samples of materials and guide learners to produce mixtures such as salt solution, sugar solution, concrete, sand and water. • In groups, learners investigate the daily uses and applications of mixtures, e.g. salt solution, sugar solution, concrete, gari and beans. • Engage learners to write the names of the components of the mixtures stated. • Learners mention other examples of mixtures and their daily uses. 	<p>Core Competencies Critical thinking and Problem-Solving Digital Literacy Communication and Collaboration</p> <p>Subject Specific Competencies Observing, Communicating Analysing</p>

STRAND 2: CYCLES
SUB-STRAND 1: EARTH SCIENCE

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
B6.2.1.1 Recognise the relationship between the earth and the sun	<p>B6.2.1.1.1 Describe the relative sizes of the earth and sun and their importance</p> <ul style="list-style-type: none"> • Prior to the lesson, task learners to investigate the relative size of the sun in relation to its function in the solar system. • Each group presents a report in class for discussion. • Learners answer the following questions: (1) Which is bigger, the sun or the earth? (2) Which of the two bodies move, the sun or the earth? • Evaluate learners by asking: “if the earth was bigger than the sun, how would that affect the length of day and night?” 	<p>Core Competencies Critical thinking and Problem-Solving Communication and Collaboration</p> <p>Subject Specific Practices Designing Experiment Planning, Communicating Observing Analysing</p>
B6.2.1.2 Show understanding of the roles of condensation, evaporation, transpiration and precipitation in the hydrological (water) cycle	<p>B6.2.1.2.1 Explain how rain falls from clouds</p> <ul style="list-style-type: none"> • Review formation of clouds with learners. • Lead learners to explain the terms: “evaporation, condensation, dew point, ice, cloud, gravity and precipitation”. • Learners, in an activity, design a model showing the formation of raindrops around tiny spots of dust or smoke and falling from high parts of a cloud. • Explain that not all clouds result in rainfall. 	<p>Core Competencies Communication and Collaboration Personal Development and Leadership</p> <p>Subject Specific Practices Observing Planning</p>
B6.2.1.3 Demonstrate understanding of how carbon and nitrogen are cycled in nature	<p>2.1.3.1 Know the functions of carbon within the environment</p> <ul style="list-style-type: none"> • Review previous lesson on the functions of carbon dioxide with learners. • Learners are assisted to discuss the following questions: (1) materials in the environment that contain carbon; (2) the role of carbon in those materials. • Learners use role-play to understand the function of carbon within the environment, e.g. the function of carbon in relation to pencils, charcoal, food and carbon dioxide. 	<p>Core Competencies Communication and Collaboration Personal Development and Leadership</p> <p>Subject Specific Practices Observing Planning</p>

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
B6.2.1.4 Recognise water and air as important natural resources	<p>B6.2.1.4.1 Investigate ways of conserving water in the home, school and community</p> <ul style="list-style-type: none"> • Discuss qualities of good drinking water and ways of making water safe for use with learners, e.g. sedimentation, boiling, filtration, adding alum, etc. • Learners identify activities in the home that require the use of water. • Learners write various activities which portray the right use of water in the home and other activities that show the wastage of water. • Discuss ways of using water wisely and efficiently in the home and community with learners. • Learners create a flyer or posters on water conservation with cut-out pictures and phrases on how to conserve water. <p>B6.2.1.5.2 Demonstrate that air supports burning</p> <ul style="list-style-type: none"> • Review composition of air and the uses of the components • Learners, in groups, use simple experiments to show that air supports burning, using a lighted candle and a glass jar (or an improvised jar). 	<p>Core Competencies Communication and Collaboration Personal Development and Leadership</p> <p>Subject Specific Practices Observing Planning</p>
	SUB-STRAND 2: LIFE CYCLES OF ORGANISMS	
B6.2.2.1 Demonstrate understanding of the life cycle of a plant	<p>B6.2.2.1.1 Know the materials needed for the survival of plants in the environment (water, carbon dioxide, oxygen, sunlight)</p> <ul style="list-style-type: none"> • Review previous lesson on composition and uses of air. • Prior to the lesson, learners investigate the materials required for plant survival. • Learners present their findings on the materials required for plant survival. • Using annotated diagrams, learners show sources and point of entry of the essential materials into the plants. • Learners are guided to conduct an experiment to show the effect of water on plants' survival. • Learners are assigned to find out the specific functions of oxygen, carbon dioxide, sunlight and water in the survival of plants. <p>B6.2.2.1.2 Observe the life cycle of a plant (okra or maize plant)</p> <ul style="list-style-type: none"> • Guide learners to plant viable maize and okra seeds and care for them until they bear fruits. • Learners observe the growing plants weekly and record the changes that take place until other viable seeds are produced. • Learners write a report based on their observations. 	<p>Core Competencies Communication and Collaboration Critical Thinking and Problem-Solving</p> <p>Subject Specific Practices Observing Recording Analysing Planning Designing Manipulating Measuring Evaluating</p>

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

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
<p>B6.3.1.1 Recognise that different parts of the human body work interdependently to perform a specific function</p>	<p>B6.3.1.1.1 Explain the functions of organs in the excretory system of humans</p> <ul style="list-style-type: none"> • Engage learners to review the functions of some human organs. • Learners explain the need for activities such as breathing, urinating and sweating. • With the aid of videos, charts or models, assist learners to identify the organs of the excretory system of humans (kidneys, lungs, skin, liver). • Learners, in an activity, match the parts of the excretory system with their excretory products. • Build vocabulary of learners by explaining key biological terms such as urea, kidney, lungs and excretion. • Learners are provided with materials such as blu tack or clay to mould the kidney of humans. <p>NB: The lesson should mainly focus on the kidneys, lungs, skin, and their excretory products.</p>	<p>Core Competencies Communication and Collaboration Personal Development and Leadership Creativity and Innovation</p> <p>Subject Specific Practices Planning Observing Communicating</p> <p>Recording Analysing Evaluating,</p>
SUB-STRAND 2: THE SOLAR SYSTEM		
<p>B6.3.2.1 Show understanding of the motion of bodies in the solar system</p>	<p>B6.3.2.1.1: Explain the difference between a star, a planet and a satellite</p> <ul style="list-style-type: none"> • Show videos, models or pictures of the solar system and engage learners to identify the planets in the system. • Draw the solar system on the board, using different colours to illustrate the different bodies. • Learners tell what they see when they view the sky during the night and during day time? • Based on their answers, use the chart to explain that a star is a heavenly body that produces its own light and is stationary (does not move). • Using the solar system as an example, guide learners to understand that a planet is a body that moves around a star (e.g. the earth and the other planets move around the sun). • Similarly, explain to learners that a satellite is a smaller body that moves around a bigger one, e.g. the moon is a satellite of the earth. • Engage learners in a game that mimics the solar system (e.g. place a chair at the centre of the football field with one learner to represent the sun. Now ask 8 learners to go around the chair in circles to represent the planets). 	<p>Core Competencies Digital Literacy Personal development and leadership Communication and Collaboration</p> <p>Subject Specific Practices Observing Analysing Evaluating Generalising</p>

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
SUB-STRAND 3: ECOSYSTEM		
B6.3.3.1 Show understanding of ecosystems, interdependency of organisms in an ecosystem and appreciate the interactions	B6.3.3.1.1 Investigate various interactions in an ecosystem and the effect on humans <ul style="list-style-type: none"> • Show learners pictures of different ecosystems. • Learners observe different ecosystems in the field such as a small bush or pond. • Engage learners to brainstorm to come out with possible interactions that occur in the given ecosystem. • Learners work in groups to draw or design different ecosystems in the classroom. • Learners observe each of the ecosystems and identify some possible interactions that can take place within each ecosystem they have designed. • Guide learners to discuss the effects of interactions (hunting, farming and predation) on humans and other living things within a given ecosystem. 	Core Competencies Critical thinking and Problem-Solving Communication and Collaboration Personal Development and Leadership Subject Specific Practices Designing Planning Observing Analysing

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

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
<p>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</p>	<p>B6.4.1.1.1 Compare renewable and non-renewable sources of energy</p> <ul style="list-style-type: none"> • Begin by asking the following questions: (1) what is energy? (2) Where does energy come from? (answers to this question may include the sun, batteries, food, firewood and hydroelectric power and thermal plants) • Show pictures and videos of different sources of energy such as the sun, batteries, food and water. • Learners work in groups to identify sources of energy and sort them into sources that are not depleted when used (solar, wind and hydro sources) and those that are depleted after use (firewood, batteries, food, gasoline, diesel, kerosene, etc.). • Learners present their responses on flashcards for a general discussion in class. • 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. 	<p>Core Competencies Critical thinking and Problem-Solving Communication and Collaboration</p> <p>Subject Specific Practices Planning Observing Analysing Synthesising Generating</p>
<p>B6.4.1.2 Show understanding of the concept of heat energy in terms of its importance, effects, sources and transfer from one medium to another</p>	<p>B6.4.1.2.1 Measure the temperature of a body using a thermometer</p> <ul style="list-style-type: none"> • Assist learners to reflect on their previous knowledge on heat and temperature (temperature refers to the degree of hotness of a body). • Provide clinical and laboratory thermometers or show pictures of different types of thermometers. • Learners identify the equipment and where and when it is used. • Guide learners, in groups, to produce their own improvised thermometers using plastic bottles, plastic straws, dyes and water. • Some learners share experiences of how their body temperatures were measured on a visit to a health centre. • Learners demonstrate the use of thermometers to measure temperature of their bodies and that of warm water <p>NB: Let learners be aware of the precautions in using the clinical and laboratory thermometers.</p>	<p>Core Competencies Critical thinking and Problem-Solving Communication and Collaboration Personal development and leadership</p> <p>Subject Specific Practices Planning Observing Recording Measuring Generating</p>

SUB-STRAND 2: ELECTRICITY AND ELECTRONICS

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
<p>B6.4.2.1 Demonstrate knowledge of generation of electricity, its transmission and transformation into other forms</p>	<p>B6.4.2.1.1 Construct an electric circuit and know the functions of its components</p> <ul style="list-style-type: none"> • Engage learners to discuss the basic components of an electric circuit (use video demonstrations where available). • Note that the basic components are the battery (dry cell), bulb, connecting wire, switch/key, etc. • Learners mention the roles of the components of the electric circuit. • Learners, in groups, provide them with the electrical components and assist them to construct a functional simple electric circuit. • Learners draw the circuits they have constructed. <p>B6.4.2.1.2 Identify the symbols used in representing various components in a given circuit diagram</p> <ul style="list-style-type: none"> • Identify and match basic components of an electric circuit with their symbols. • Learners, in groups, draw simple circuit diagrams using symbols of the components (switch, connecting wires, battery, electrical bulb). • <p>B6.4.2.1.3 Know conductors, semi-conductors and insulators</p> <ul style="list-style-type: none"> • Gather items such as bulbs, battery, electric wires. • Brainstorm with learners on the meaning of the terms “conductors”, “semi-conductors” and “insulators” with examples. • Learners are provided the following materials (spoons, foils, drinking straw, plastic materials, piece of wood, glass rod, leather, nails, keys, pencils, pens, LEDs, diodes, etc.) for an activity. • Connect a simple electrical circuit (an open circuit) using a bulb, battery and connecting wire. • Learners use the open circuit to classify the materials provided as conductors, semi-conductors and insulators. • Learners explain why the electrical wires in their homes are coated with plastics 	<p>Core Competencies Critical thinking and Problem-Solving Communication and Collaboration</p> <p>Subject Specific Practices Planning Observing Manipulating Generating</p> <p>Core Competencies Critical thinking and Problem-Solving Communication and Collaboration</p> <p>Subject Specific Practices Planning Observing Manipulating Communicating Generating</p>

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
B6. 4.2.2 Know the functions and assemblage of basic electronic components	<p>B6.4.2.2.1 Construct an electronic circuit using battery, connecting wire and LED</p> <ul style="list-style-type: none"> • Put learners into mixed ability groups for this activity. • Provide learners with connecting wires, LED and battery. • Learners, in their groups, connect a series circuit comprising an LED, 3V battery, a switch, to light the LED. • Learners discuss what they did to light the LED. • Learners are tasked to draw the electronic circuit and label the parts. <p>NB: Build a stock of electronic components from discarded electronic gadgets such as radio and TV sets, phone chargers and flashlights.</p>	<p>Core Competencies Critical thinking and Problem-Solving Communication and Collaboration Personal development and leadership</p> <p>Subject Specific Practices Planning, Observing Manipulating Evaluating Communicating Generating</p>
SUB STRAND 3: FORCES AND MOVEMENT		
B6.4.3.1 Know that movement is caused by applied forces due to the release of stored energy	<p>B6.4.3.1.1 Recognise the relationship between energy and forces</p> <ul style="list-style-type: none"> • Learners form different groups to undertake activities on application of forces, e.g. pulling items across a distance, lifting up loads of different weights. • Learners brainstorm on the relationship between energy and forces, e.g. why is it more difficult to lift a table than a book? • Lead learners to explain that when a force acts on an object, it first needs to overcome the 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. • Relate this to the need to apply more energy/effort in our daily activities to be successful (Weeding with a cutlass, cutting a tree etc.). <p>NB: The greater the force exerted on a body/machine, the greater the work done.</p>	<p>Core Competencies Critical thinking and Problem-Solving Communication and Collaboration Creativity and innovation</p> <p>Subject Specific Practices Planning, Observing Manipulating, Communicating, Generating</p>

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
<p>B4.4.3.2 Recognise some simple machines used for making work easier, analyse their advantages and know their uses</p>	<p>B6.4.3.2.1 Identify levers, pulleys, inclined planes as classes of simple machines and cite some common examples</p> <ul style="list-style-type: none"> • Lead learners to visit various workplaces where levers, pulleys or inclined planes are used in their work or show pictures of different classes of simple machines. • Learners talk about their experiences on the visit. • Learners are shown examples of simple machines (screw drivers, pliers, scissors, wheel barrow, shovel, hammer, spanners, axe, rake, cutlass, hoe, mattock, crowbar, claw hammer, screws, wooden board, to identify and classify them as levers, pulleys or inclined planes). • Learners demonstrate proper ways of using simple machines. <p>Project: Design and Make Simple Machines <i>Learners design and make simple machine of their choice from suitable materials such as bamboo, wood, cardboard, plastics, paper and straws.</i></p>	<p>Personal Development and Leadership Communication and Collaboration Creativity and innovation</p> <p>Subject Specific Practices</p> <p>Planning, Observing Manipulating</p>

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

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
<p>B6.5.1.1 Recognise the importance of personal hygiene</p>	<p>B6.5.1.1.1 Identify the causes and effects of foul body odour on humans and how it can be prevented</p> <ul style="list-style-type: none"> • Learners, in groups, discuss the causes of body odour. • 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. • Learners pair-share their ideas and present to the whole class. • Present real items or materials that can be used to prevent foul body (lime, lemon, deodorant, etc.) odour to learners in class and demonstrate their correct use. • Evaluate learners by letting them plan and design a project on how to eliminate foul body odour. <p>NB: Activities should include the use of lime and lemon for cleaning the armpit, regular bathing and cutting of hair and nails).</p> <p>B6.5.1.1.2 Describe ways of minimising waste</p> <ul style="list-style-type: none"> • Learners watch pictures and videos showing and describing ways of minimising waste in the environment. • In groups, learners discuss and come out with ideas to minimise waste in their classroom, school environment, homes and their communities. • Each group discusses measures of minimising waste in the classroom, school environment, home, market, at the bus station, hospitals, church, mosque, beach, etc. • Learners present their ideas to the whole class. • Evaluate learners by assisting each group design a poster. <p>Project; Designing litterbins <i>Learners plan, design and make their own litterbins for use in the class and school community.</i></p>	<p>Core Competencies Critical thinking and Problem-Solving Collaboration and communication. Personal Development and Leadership Digital literacy</p> <p>Subject Specific Practices</p> <p>Designing Experiment Planning Observing Manipulating Evaluating Communicating Generating</p>

SUB-STRAND 2: DISEASES

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
<p>B6.5.2.1 Demonstrate knowledge of common diseases of humans; causes, symptoms, effects and prevention</p>	<p>B6.5.2.1.1 Explain the causes, symptoms and prevention of Eczema</p> <ul style="list-style-type: none"> • Learners watch pictures of people suffering from eczema. • In groups, learners come out with the possible causes, symptoms and prevention. • Allow group presentations and write learners' ideas on the board. • Invite health personnel to give a talk on eczema and other common skin diseases. <p>B6.5.2.1.2 Know how to prevent meningitis</p> <ul style="list-style-type: none"> • Learners watch videos or pictures on the causes and prevention of meningitis. • Gather relevant charts on meningitis from a health centre and engage learners in a presentation on how to prevent it. • Invite a health personnel or the SHEP coordinator to give a presentation on meningitis 	<p>Core Competencies Critical thinking and Problem-Solving Collaboration and communication. Personal Development and Leadership Digital literacy</p> <p>Subject Specific Practices Observing Communicating Generating</p>
SUB-STRAND 3: SCIENCE AND INDUSTRY		
<p>B6.5.3.1 Recognise the impact of science and technology on society</p>	<p>5.3.1.1 Identify the scientific concepts and principles underlying the operation of some industries</p> <ul style="list-style-type: none"> • Learners watch a video of kenkey and salt production processes. • Learners go on a study visit to a local business venture such as kenkey, soap, salt production, cooking oil, or gari production centre. • Learners must observe the activities and interact with people at the workplace. • Engage learners, in groups, to discuss and identify the key scientific principles underlying the operations of the industries visited. • Build vocabulary of learners by explaining key terms such as evaporation, salting-out, fermentation and saponification. <p>Project <i>Give learners a project to work in groups to produce yoghurt, kenkey or soap based on the experiences from their study visits.</i></p>	<p>Core Competencies Digital literacy Critical thinking and Problem-Solving Cultural identity and global citizenship Collaboration and communication</p> <p>Subject Specific Practices Designing Experiment Planning Observing Generating</p>

SUB-STRAND 4: CLIMATE CHANGE

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCIES
<p>B6.5.4.1 Know that climate change is one of the most important environmental issues facing the world today.</p>	<p>B6.5.4.1.1 Know the effects of climate change on humans</p> <ul style="list-style-type: none"> • Learners are assigned to find out from their parents or elderly people what the weather situation has been since 2000. • Learners share their information with the whole class. • Show pictures and videos displaying activities that contribute to climate change and the associated effects on the earth. • Stress the effects of climate change on weather conditions such as drought, flooding, increase in temperature, etc. • Learners are engaged in a think-pair-share activity to come out with ways of controlling the causes of climate change. • Guide learners to design a concept map on climate change, showing its causes, effects and prevention. • Build the vocabulary of learners by explaining terms such as climate change, drought, flooding and temperature. • Engage learners in an awareness campaign on climate change issues in the school and nearby community, using placards, posters and banners. • Learners work in groups to plant and nurture trees at vantage points in the school environment. • Learners predict what will happen if there are no trees in the world. 	<p>Core Competencies Digital literacy Critical thinking and Problem-Solving Collaboration and communication. Personal Development and Leadership</p> <p>Subject Specific Practices Designing Experiment Planning Observing Communicating Generating Analysing Evaluating</p>

SCIENCE SUBJECT PANEL MEMBERS AND REVIEWERS

NAME	INSTITUTION
Writing panels	
Prof Anthony Krueger	Department of Science Education, UCC
Prof Leonard Amekudzi	Dept of Physics, KNUST
Mr Antwi-Aning	NaCCA-NEAU
Mercy Nyamekye	NaCCA
Olivia Opare	Science Education Unit, GES
Saddik A. Mohammed	Ga South Municipal Education Office
Cosmos Eminah	NaCCA
Expert Reviewers	
Prof. John K. Eminah	UEW
Dr. Fiifi Mensah	UCC
Curriculum Adviser	
Dr. Sam K. Awuku	
Supervisor	
Felicia Boakye-Yiadom (Mrs)	NaCCA, Outgoing Acting Executive Secretary
Dr. Prince H. Armah	NaCCA, Incoming Acting Executive Secretary