TEACHER'S RESOURCE PACK

Science BASIC 7

NATIONAL COUNCIL FOR CURRICULUM & ASSESSMENT OF MINISTRY OF EDUCATION

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Part A

1 Introduction

1.1 How to use this pack

This pack is meant to help you to get an insight into what is in the curriculum to inform you in your facilitation of science lessons. It gives hints to you which you must take note of for successful implementation of this curriculum. Read the explanation of the strand; sub-strand; content standard; and learning indicators. There are key words/concepts you have to understand and address them in the lesson facilitation.

Read ahead of the lesson about the suggested activities to be organized or facilitated for learners to carry out. This will enable you fore see any challenges you might face and prepare to overcome them. Note that the activities are not exhaustive. You may use any related activity you think is appropriate. The activities are developed from the indicators that are perceived to be challenging to be facilitated. A sample lesson plan format has been provided which should guide you to prepare a plan for your lesson. It should be noted that good facilitation/teaching depends on good and meticulous planning so you must necessarily have plan for your lesson.

1.2 Rationale For B7 – B10 Integrated 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, socially relevant and adopt science as a culture.

1.3 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 using both indigenous and western technology.

1.4 Learning Philosophy

Science Learning is an active contextualised 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 as they interact with their classroom and out of classroom environments. This makes learning more relevant to the learner

and leads to the development of critical thinkers and problem solvers.

1.5 Aims of Science

The science curriculum is designed to help learners to:

1. 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 a 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.

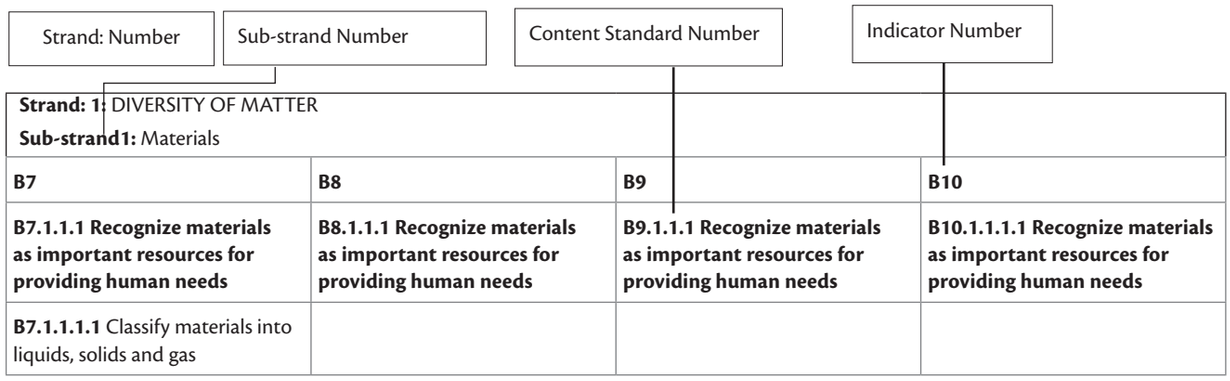
1.6 Structure and organisation of the Science curriculum

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. An example of the annotation is indicated in Table 1.

Table 1: Example of annotation B7 .2.4.1.2

ANNOTATION	MEANING/REPRESENTATION
B7	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.
Indicators are clear outcomes 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.
Exemplars serve as support and guidance, which clearly explain the expected outcomes of indicators and suggest what teaching and learning activities could support the facilitators/teachers in the delivery of the curriculum**.**



1.6.1 Common Core Science Standards:

LEVEL	B7	B8	B9	B10
STRAND	**SUB-STRANDS**	**SUB-STRANDS**	**SUB-STRANDS**	**SUB-STRANDS**
DIVERSITY OF MATTER	**1.** Materials **2.** Living cells	**1.** Materials **2.** Living cells	**1.** Materials **2.** Living cells	**1.** Materials **2.** Living cells
CYCLES	**1.** Earth Science **2.** Life Cycles of Organisms **3.** Crop Production **4.** Animal Production	**1.** Earth Science **2.** Life Cycles of Organisms **3.** Crop Production **4.** Animal Production	**1.** Earth Science **2.** Life Cycles of Organisms **3.** Crop Production **4.** Animal Production	**1.** Earth Science **2.** Life Cycles of Organisms **3.** Crop Production **4.** Animal Production
SYSTEMS	**1.** The Human Body Systems **2.** The Solar System **3.** Ecosystems **4.** Farming Systems	**1.** The Human Body Systems **2.** The Solar System **3.** Ecosystems **4.** Farming systems	**1.** The Human Body Systems **2.** The Solar System **3.** Ecosystem **4.** Farming systems	**1.** The Human Body Systems **2.** The Solar System **3.** Ecosystems
FORCES AND ENERGY	**1.** Energy **2.** Electricity and Electronics **3.** Conversion and Conservation of Energy **4.** Force and Motion **5.** Agricultural Tools	**1.** Energy **2.** Electricity and Electronics **3.** Conversion and Conservation of Energy **4.** Force and Motion **5.** Agricultural Tools	**1.** Energy **2.** Electricity and Electronics **3.** Conversion and Conservation of Energy **4.** Force and Motion **5.** Agricultural Tools	**1.** Energy **2.** Electricity and Electronics **3.** Conversion and Conservation of Energy **4.** Force and Motion **5.** Agricultural Tools
HUMANS AND THE ENVIRONMENT	**1.** Sanitation and Waste Management Systems **2.** Human Health **3.** Science and Industry **4.** Climate Change and Green Economy **5.** Understanding the Environment	**1.** Sanitation and Waste Management Systems **2.** Human Health **3.** Science and Industry **4.** Climate Change and Green Economy **5.** Understanding the Environment	**1.** Sanitation and Waste management system **2.** Human Health **3.** Science and Industry **4.** Climate Change and Green Economy **5.** Understanding the Environment **6.** Soil as Components of the Environment	**1.** Sanitation and Waste Management Systems **2.** Human Health **3.** Science and Industry **4.** Climate Change and Green Economy **5.** Understanding the Environment **6.** Soil as Components of the Environment
5	**20**	**20**	**21**	**20**

1.6.2 Science Scope and Sequence

STRAND	SUB-STRANDS	B7	B8	B9	B10
DIVERSITY OF MATTER	**1.** Materials	√	√	√	√
	2. Living Cells	√	√	√	√
CYCLES	**1.** Earth Science	√	√	√	√
	2. Life Cycles of Organisms	√	√	√	√
	3. Crop Production	√	√	√	√
	4. Animal Production	√	√	√	√

SYSTEMS	**1.** The Human Body Systems	√	√	√	√
	2. The Solar system	√	√	√	√
	3. Ecosystems	√	√	√	√
	4. Farming Systems	√	√	√	x
FORCES AND ENERGY	**1.** Energy	√	√	√	√
	2. Conversion and Conservation of Energy	√	√	√	√
	3. Electricity and Electronics	√	√	√	√
	4. Forces and Motion	√	√	√	√
	5. Agricultural Tools	√	√	√	√
HUMANS AND THE ENVIRONMENT	**1.** Waste Management	√	√	√	√
	2. Human Health	√	√	√	√
	3. Science and Industry	√	√	√	√
	4. Climate Change and Green Economy	√	√	√	√
	5. Understanding the Environment	√	√	√	√
	6. Soil as Component of the Environment	x	x	√	√

2 Planning, teaching and assessment

2.1 Creative and learner-centred teaching and assessment

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

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

2.1.1 Demonstrations

- The teacher retains the formal authority role by showing learners what they need to know. E.g. Demonstrating how to construct an electronic circuit.

2.1.2 Inquiry-based learning

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

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

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

2.1.4 Project-based learning

- Project-based learning is a teaching method which learners gain knowledge and skills by

working for an extended period of time. E.g. reading and recording the school/home's electricity consumption over a month.

- This focuses on investigating and responding to an authentic, engaging and complex question, problem, or challenge. E.g. how to solve the problem of poor sanitary conditions in the school.

2.2 Assessment

Assessment "as" "for", and "of" learning. 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 his 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.

2.3 Instructional expectations

You have to:

- 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.
- Select science content, adapt and plan it to meet the interests, knowledge, understanding, abilities, and experiences of learners.
- Let learners feel that you are working 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.
- 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.
- Design and manage learning environments that provide learners with the time, space, and resources needed for learning Science.

2.4 Sample Yearly Scheme of Learning

Sample yearly scheme of learning has been shown in Table 2

Table 2: Yearly Scheme of Learning

Week Number	First Term (List of Sub-Strands)	Second Term (List of Sub-Strands)	Third Term (List of Sub-Strands)
1	B7.1.1 Materials	B7.3.2 The Solar system	B7.4.3 Conversion And Conservation Of Energy
2	B7.1.1 Materials	B7.3.3 Ecosystem	B7.4.3 Conversion And Conservation Of Energy
3	B7.1.2 Living Cells	B7.3.4 Farming Systems	B7.4.3 Conversion And Conservation Of Energy
4	B7.2.1 Earth Science	B7.4.1 Energy	B7.4.3 Conversion And Conservation Of Energy
5	B7.2.2 Life Cycle of Organisms	B7.4.1 Energy	B7.5.3 Science and Industry
6	B7.2.3 Crop Production	B7.4.1 Energy	B7.4.4 Force and Motion
7	B7.2.4 Animal Production	B7.4.2 Electricity and Electronics	B7.4.4 Force and Motion
8	B7.2.4 Animal Production	B7.4.2 Electricity and Electronics	B7.5.4 Climate Change and Green Economy
9	B7.2.4 Animal Production	B7.4.2 Electricity and Electronics	B7.5.5 Understanding the Environment
10	B7.3.1 The Human Body Systems	B7.4.5 Agricultural Tools	B7.5.5 Understanding the Environment
11	B7.3.1 The Human Body Systems	B7.5.1 Waste Management	Revision of Indicators and Exemplars
12	B7.3.1 Human Health	Revision of Indicators and Exemplars	End of Term Assessment
13	Revision of Indicators and Exemplars	End of Term Assessment	End of Term Assessment
14	End of Term Assessment	End of Term Assessment	
15	End of Term Assessment		

2.5 Sample lesson plan format

The format is to serve as a guide to you so that you can format your lesson plan along it

Date: 26/3/2020	**Period: 1st**	**Subject : Science**
Duration : 50 minutes		**Strand 4: Forces and energy**
Class: B7	**Class Size: 45**	**Sub-strand 2: Electricity and electronics**
Content Standard: **B7.4.2.2** Demonstrate knowledge of how to assemble and explain the functions of basic electronic components and their interdependence in an electronic circuit	**Indicator:** **B7.4.2.2.1** Demonstrate how to assemble basic electronic components in an electronic circuit.	**Lesson 1** of 1
Performance indicator: Learners can assemble and examine basic electronic components, and arrange them in an electronic circuit.		**Core competencies** **DL 5.3** **CI 6.8**
Key words: Electronics, Light emitting diode, diode, resistor, capacitor, electronic circuit.		
Phase/Duration	**Learners' Activities**	**Resources**
Phase 1: Starter – Introduction (Preparing the brain for learning)	Ask learners in groups to brainstorm to bring out the meaning of electronics by watching videos or pictures of electronic components. Take feedback from the learners.	LEDs, P-N Junction diodes, colour code resistors Capacitors. Pictures, videos, drawings of electronic components.
Phase 2: Main (New learning) including assessment and lesson development	**1.** Engage learners in groups to examine electronic components such as types of LEDs, P-N Junction diodes, colour code resistors and capacitors, **2.** Let learners present their observations in class for discussion. **3.** Demonstrate how to arrange the electronic components in a circuit to learners. **4.** Guide learners in groups to arrange electronic components in a circuit. Learners observe and discuss their observations. **ASSESSMENT** **1.** Distinguish between LED and diode. **2.** Write down the colours of the resistor. **3.** Describe how electronic components are arranged in an electronic circuit. Support your description with a diagram.	
Phase 3: Plenary/Reflections (Closure – the concluding activities like recap and assessing if the standard or indicator has been attained)	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarise the lesson. Ask learners how the lesson will benefit them in their daily lives.	

2.6 Sample assessment tasks

Sample tasks are provided which could be used for assessment (See part B of Learners' Resource Pack

2.7 Resources

Resources which may be used to facilitate teaching and learning are suggested in the pack. The list is not exhaustive so the teacher is at liberty to use analogous materials that can conveniently work. The resources should be locally available and easy to obtain materials.

Part B

Strand 1: Diversity of Matter			
Sub-Strand 1: Materials			
Content Standard(s) B7.1.1.1 Recognise materials as important resources for providing human needs			
Indicator(s) B7.1.1.1.1 Classify materials into liquids, solids and gas			
Key words/vocabulary: Resources, Solid, Liquid, Gas, Water Vapour			
Suggested activities for learning and assessment	**Equipment/Resources**	**Learner Resource page ref**	**Progression**
Let learners:			
1. Engage in naming and describing materials assembled from the environment in terms of texture, appearance, colour, smell and shape.	Water, cooking oil, sand, gravel, vinegar, soft drink, water vapour, source of heat, liquid medicine any others available.		**1.** Naming of materials in the environment **2.** Describing materials in the materials **3.** Grouping of materials into liquids, solid and gases. **4.** Demonstrating presence of air
2. Group the materials into liquids, solids and gases and give reasons for the grouping			
3. Discuss the differences between liquids, solids and gases. (*Initiate the discussion by using question(s). Ensure that when students are discussing they should talk extensively about the issues bringing their view points*).			
4. Perform activities to demonstrate the presence of air(gas). *For example heating water in a receptacle and tie the open end of a plastic bag to the mouth of the receptacle to form a balloon. Let the learners observed the plastic bag and explain why the plastic bag ballooned. Caution: Ensure that the hot water does not pour on the learners. Any other appropriate activity can be performed by the learners.*	Water, plastic bag, a thread, a source of heat.		
Homework/project work/community engagement suggestions			
Let learners: **1.** Visit industries within the locality to identify the different types of liquids, solids and gases. **2.** Identify materials at home and classify them into solids, liquids and gases. **3.** Find out why water is visible; and air is not.			
Cross-curriculum links/cross-cutting issues			
• Subjects like Career Technology and Physical and Health Education use solids and liquids in their activities. Therefore cross check with teachers of these subjects to see if solids and liquids are treated before you facilitate learning of them.			
Potential misconceptions/student learning difficulties			
The misconception that air supports burning should be addressed. **Note** that it is the oxygen component of air that supports burning and not the whole air.			

Strand 1: Diversity of Matter			
Sub-Strand 1: Materials			
Content Standard(s) B7.1.1.1Recognise materials as important resources for providing human needs			
Indicator(s) B7.1.1.1.2 Discuss the importance of liquids in the life of humans			
Key words/vocabulary: Liquids, water, milk, soft drink, cooking oil, engine oil, etc.			
Suggested activities for learning and assessment:	**Equipment/Resources**	**Learner Resource page ref**	**Progression**
Let Learners:			
1. Engage in an audit of liquid materials they see in their school environment.	Water, Milk, Soft drink, Cooking oil, Common acids and bases.		**1.** Importance of liquids to human life **2.** Need to preserve named liquids **3.** Functions of named liquids
2. Explore the importance of liquids to human life in small groups looking at a video/picture/ diagram etc. and present a report on what they have found			
3. In small groups, elaborate on the need to preserve named liquids for human use.			
4. Discuss the functions of named liquids to human life as a way of understanding of the importance of liquids they have covered			
5. Provide the names of other liquids which have not been mentioned and let learners assess their knowledge on the specific importance of them in their school environment.	Dettol, cough mixture, 'sobolo' (a local drink), 'pito', palm wine and many others.		
Homework/project work/community engagement suggestions			
Let learners find out the importance of liquids used in their community.			
Cross-curriculum links/cross-cutting issues			
Subjects like Career Technology and Physical Education and Health use solids and liquids in their activities. Therefore cross check with teachers of these subjects to see if solids and liquids are treated before you facilitate learning of them.			
Potential misconceptions/student learning difficulties			
Learners may misconceive liquids to be as light as water but some liquids are thick so let them note that liquids can have various viscosity			

Strand 1: Diversity of Matter			
Sub-Strand 1: Materials			
Content standard: B7.1.1.1 Recognise materials as important resources for providing human needs			
Indicator(s): B7.1.1.1.3 Discuss the importance of specific solids to life			
Key words/vocabulary: environment, survival, human needs, life, important, solids, resource			
Suggested activities for learning and assessment.	**Equipment/Resources**	**Learner Resource page ref**	**Progression**
Let learners:			
1. Identify solids in the environment that support the survival of humans and other life forms. Name and describe materials assembled from the environment in terms of texture, appearance, colour, smell and shape.	iron bars, tables, chair, table salt, sugar, ice block, frozen carbon dioxide (dry ice), glass, rock, metallic objects, and wood.		**1** Identify solids **2** Name and Describe materials **3** Explanation of the need to preserve solids for use **4** Model objects from solid materials
2. Explain the need to preserve useful solid materials in the environment for life.	Trees in the forest, animals in the environment, the land, fish, snail, dry cell etc.		
3. Model objects from solid materials that can be useful to humans and other life forms.	Clay, empty bottles, palms nuts, palm fronds, cement block etc.		
Homework/ project work/community engagement suggestions			
Let learners search the internet, books, parents, people in their community to identify any household and commercial materials and explain their uses to humans.			
Cross-curriculum links/cross-cutting issues			
Find out when materials are treated in Career Technology and teach this at the same time.			
Potential misconceptions/student learning difficulties			
Explain to learners that some solids and their other states can easily exhibit the same characteristics even when conditions differ.			

STRAND 1: Diversity of matter			
SUB-STRAND 2: Living cells			
Content standard: B7.1.2.1 Demonstrate an understanding of the structure of organisms of cells in living systems			
Indicator(s): B7.1.2.1.1 Describe the structure and function of living cells of an animal			
Key words/vocabulary: Organelle, mitochondrion, nucleus , cell wall , epidermis			
Suggested activities for learning and assessment.	**Equipment/Resources**	**Learner Resource page ref**	**Progression**
Let learners:			
1. Identify and describe the structure of an animal cell from video, chart and magnifier	Microscope, slide, mounting needle or pin, and models, magnifier		**1.** Structure of animal cell. **2.** Function s of organelles of animal cells. **3.** Drawing structure of animal cells. **4.** Developing model of animal cells.
2. Discuss the functions of organelles in the animal cell such as the nucleus and mitochondrion			
3. Draw and label animal cell			
4. Develop a model to represent an animal cell using local materials.			
Homework/project work/community engagement suggestions			
1. Let learners draw and label the structure of animal cells, they should describe and explain the functions of organelles of animal cell.			
Cross-curriculum links/cross-cutting issues			
Physical Education and Health: Learners use energy produced from an organelle such as mitochondrion for physical activity			
Potential misconceptions/student learning difficulties			
Let learners know that there are other cells used in physics e. g. dry cells used to produce energy for physical activity but living cells are building blocks of organisms			

Strand 1: Diversity Of Matter			
Sub-Strand 2: Living Cells			
Content standard: B7.1.2.1Demonstrate an understanding of the structure of organisms and functions of cells in living systems			
Indicator(s) B7.1.2.1.2 Examine the functions of organelles in a plant cell			
Key words/Vocabulary: Nucleus, cytoplasm, mitochondria, vacuole, chloroplast and organelles			
Suggested activities for learning and assessment	**Equipment/Resources**	**Learner Resource page ref**	**Progression**
Let learners:			
1. Identify and describe the structure of a plant cell from video, chart and magnifier.	Microscope, cover slip, slide, mounting needle or pin, onion bulb or cocoyam leaves and Iodine solution, models		**1.** Identification and description of the structure of a plant cell **2.** Discussion of the functions of organelles of plant cell **3.** Drawing and labelling of plant cell **4.** Developing a model of plant cell.
2. Discuss the functions of organelles in the plant cell such as the nucleus and mitochondrion			
3. Draw and label plant cell			
4. Develop a model to represent a plant cell using local materials.			
Homework/project work/community engagement suggestions			
Let learners: **1.** Draw a well-labelled drawing of a plant cell, describe and explain one function each of the following organelles: Cytoplasm, chloroplast, vacuole, mitochondrion and nucleus. **2.** Explain why plant cells have definite shape. **3.** Find out and write about the importance of cell membrane and cellulose cell wall of a plant cell. **4.** Design and mould a plant cell using Reference Learner Resource Pack B7.1.2.1			
Cross-curriculum links/cross-cutting issues			
Career Technology: Learners use plant materials to design things.			
Potential misconceptions/student learning difficulties			
Learners often get confused with the definition of living cells and dry cells. **Note** that both plant and animal cells are living cells, whiles; batteries are examples of dry cells. Show pictures of living and non-living cells for learners to identify.			

STRAND 2: Cycles

SUB-STRAND 1: Earth Science

Content standard: B7.2.1.1 Recognise that the water cycle is an example of repeated patterns of change in nature and understand how it occurs

Indicator(s): B7.2.1.1.1 Know how water cycle occurs as a repeated pattern in nature

Key words/vocabulary: Transpiration, condensation, precipitation, evaporation, collection, water cycle

Suggested activities for learning and assessment.	**Equipment/Resources**	**Learner Resource page ref**	**Progression**
Let learners: **1.** Discuss where Earth's water came from and how long it has been there. **2.** Share their initial ideas with the class. **3.** List the stages of the water cycle: Evaporation, Condensation, Precipitation and Transpiration while watching pictures and videos. **4.** Draw a flow chart or diagram to show the order of the stages in the water cycle and how they are linked to each other.	Videos Pictures Charts Drawings Pop bottles Ice crystals		**1.** Discussing the origin of earth water. **2.** Listing the stages of the water cycle **3.** Drawing a Flow chart or making a diagram of water cycle

Homework/project work/community engagement suggestions

Let learners do the following homework:

1. Explain the following terms:
   - **i.** Transpiration
   - **ii.** Evaporation
   - **iii.** Condensation
   - **iv.** Precipitation

2. Draw a flow chart to show the order of the stages in the water cycle

3. Explain why the water cycle is a repeated pattern in nature.

4. Find out why the water cycle is important in nature.

5 . Make rain in a jar to illustrate the water cycle.

6. Create posters on the water cycle

7. Find out whether water is a renewable or non-renewable resource and justify their position in a whole-class discussion.

Cross-curriculum links/cross-cutting issues

Social Studies: Learners use the idea of the water cycle to understand rain formation and rainfall

Potential misconceptions/student learning difficulties

1. Let learners know that there is controversy about how water got to earth, scientists (geologists) are in general agreement about how long it has been in existence.

2. Let learners know that there is difficulty in conceptualising and seeing the water cycle in real life situation.

<table>
<tr><td colspan="4">Strand 2 : Cycles</td></tr>
<tr><td colspan="4">Sub-Strand 1 : Earth Science</td></tr>
<tr><td colspan="4">Content standard: B7.2.1.1 Recognise that the water cycle is an example of repeated patterns of change in nature and understand how it occurs</td></tr>
<tr><td colspan="4">Indicator(s): B7.2.1.1.2 Describe the importance of the water cycle in nature.</td></tr>
<tr><td colspan="4">Key words/vocabulary: Environment, weather, pattern, energy, nature</td></tr>
<tr><td>Suggested activities for learning and assessment.
Let learners:</td><td>Equipment/Resources</td><td>Learner Resource page ref</td><td>Progression</td></tr>
<tr><td>1. Describe and explain the stages of water cycle.</td><td></td><td></td><td rowspan="3">1. Reflecting on and discussing the importance of the water cycle.
2. Explanation of situations that illustrate the water cycle</td></tr>
<tr><td>2. Reflect on and discuss the importance of the water cycle.
3. Form groups and describe the importance of the water cycle in terms of:
i. Energy source (release of energy to warm the environment);
ii. Carrier of nutrients;
iv. Improving water table;
v. Regulating weather pattern;
vi. Provision of clean water.
Note: Supervise learners to use cut-outs or alternative resource.</td><td>Videos
Pictures
Charts
Drawings
Models
Cut-outs pictures</td><td></td></tr>
<tr><td>4. Explain situations that illustrate the water cycle in their community with a diagram or diagrams.</td><td></td><td></td></tr>
<tr><td colspan="4">Homework/project work/community engagement suggestions</td></tr>
<tr><td colspan="4">Let learners do the following as homework:
Investigate the importance of the water cycle to your community.
Create cut-out pictures of the stages of the water cycle</td></tr>
<tr><td colspan="4">Cross-curriculum links/cross-cutting issues</td></tr>
<tr><td colspan="4">Farmers rely on the water cycle to help the water their crops.
Construction industry uses water for a lot of their activities
Food industry and Health sector use water for mixing of chemicals and as a universal solvent.</td></tr>
<tr><td colspan="4">Potential misconceptions/student learning difficulties</td></tr>
<tr><td colspan="4">The misconception that when clouds gather at a particular part of their community it means rain will fall. Rain drops in the clouds must come together to be bigger to overcome the upward force before it can fall as rain.
Learners find it difficult to see the water cycle in real life situations. Create other alternative activities like simulation to help the learners to understand the water cycle.</td></tr>
</table>

Strand 2 : Cycles			
Sub-strand 2 : Life Cycle of Organisms			
Content standard: B7.2.2.1 Demonstrate the skills of carrying out activities to show the stages of the life cycle of housefly, effects of its activities on humans and how to reduce them			
Indicator(s): B7.2.2.1.1 Describe the life cycle of the housefly.			
Key words/vocabulary: Life cycle, pupa, larva, adult , organism			
Suggested activities for learning and assessment.	**Equipment/Resources**	**Learner Resource page ref**	**Progression**
Let Learners:			
1. Identify the stages of the life cycle of the housefly. **2.** Describe the stages of the life cycle of the housefly.	**1.** Videos **2.** Flash cards. **3.** Charts **4.** Pictures **5.** Cut-outs **6.** Drawings **7.** Models		1. Identifying the stages of the life cycle of the housefly. 2. Arranging flashcards or cut-outs to illustrate the stages of the life cycle of a housefly. 3. Draw each stage of the life cycle of the housefly.
3. Arrange flashcards or cut-outs to illustrate the stages of the life cycle of a house fly.			
4. Draw each stage of the life cycle of the housefly and use arrows to link the stages to make the cycle complete. **Note: Cut – outs and pictures can be used for the activity.**			
Homework/project work/community engagement suggestions			
Let learners do the following home work as found in the Learners' Pack B7.2.2,1.1 **1.** Create a poster on activities of the housefly. **2.** Design an intervention that can reduce the effects of the activities of the housefly on humans. **3.** Educate people of your community about the intervention.			
Cross-curriculum links/cross-cutting issues :			
Social Studies: Learners will require the knowledge of the behaviour of the house fly in discussing the housefly as a vector of diseases when they learn about sanitation.			
Potential misconceptions/student learning difficulties			
Learners may have the misconception that the life span of a housefly is 24 hours but it is incorrect. Houseflies can live up to 20 or 30 days. It is the housefly eggs that hatch into maggots within 24 hours after they are laid.			

Strand 2: Cycles

Sub-strand 2 : Life Cycle of Organisms

Content standard B7.2.2.1 Demonstrate the skills of carrying out activities to show the stages of the life cycle of the housefly, effects of the activities on humans and how to reduce them.

Indicator(s): B7.2.2.1.2 Discuss the activities of the housefly as a menace on humans and show how to reduce the activities e.g. feeding, reproduction and any other.

Key words/vocabulary: Nuisance, disease, menace, food poison, skill, feeding, reproduction

Suggested activities for learning and assessment	**Equipment/Resources**	**Learner Resource page ref**	**Progression**
Let Learners:			
1. Form groups, use pictures, videos, models and charts to describe how and what a housefly feeds on. (E.g. feeding on dead animals, rotten food, manure, solid and liquid waste)	**1.** Pictures **2.** Videos **3.** Charts **4.** Science journals **5.** Drawings **6.** Models **7.** Cut-outs **8.** Internet		**1.** Forming groups and describing how and what a housefly feeds on. **2.** Discussing how the activities of the housefly affect humans. **4.** Exploring and designing an intervention to reduce the activities of houseflies on humans.
2. Discuss how the activities of the housefly affect humans in terms of: **a)** i. transfer of types of diseases (such as dysentery); ii. food poisoning; iii. nuisance in the environment			
3. Explore and design an intervention that can reduce the effects of the activities of the housefly on humans. **4.** Educate people of their community about the intervention. NB: Encourage learners to do group presentations in class, school and in the community.			

Homework/project work/community engagement suggestions

Let learners do the following as homework as shown in B7.2.2.1.2

1. Design an intervention that can reduce the effects of the activities of the housefly on humans.

2. Educate people of your community about the intervention.

Cross-curriculum links/cross-cutting issues

Social Studies: Learners will use the knowledge about the housefly activities to prevent the spread of diseases and to humans when treating sanitation issues.

Potential misconceptions/student learning difficulties

Learners may not know that maggots are produced by house flies, They may think the maggots occur in nature. If you make learners expose fish to house flies for a period of time and observe the emergence of maggots the misconception will be cleared

The difficulty is how the housefly poisons food and the associated transfer of diseases. People don't really see houseflies as dangerous species. When they get in touch with food they deposit germs which we cannot see with our naked eyes.

Strand 2 : Cycles

Sub-strand 3 : Crop Production

Content standard: B7.2.3.1 Demonstrate an understanding of the different plant nutrients (organic, and inorganic fertilizers) and their application in school farming (school gardening)

Indicator(s): B7.2.3.1.1 Observe and list all plant nutrients sources available in a community and categorise them into organic and inorganic nutrient sources.

Key words/vocabulary: Organic, inorganic, nutrient, fertilizer, plant nutrient s source

Suggested activities for learning and assessment	Equipment/Resources	Learner Resource page ref	Progression
1. Engage learners to observe different types of fertilizers from the resources available and present their observations and findings in their own words for discussion in the class. **Note :** Focus is on organic and inorganic plant fertilizers	**1.** Samples of organic and inorganic fertilizers **2.** Videos **3.** Charts **4.** Pictures		**1.** Observing different types of fertilizers and presenting observations **2.** Discussing and suggesting reasons for differences between organic and inorganic fertilizers. **3.** Comparing organic and inorganic nutrient sources required by different plants.
2. Ask learners to discuss and suggest reasons for the differences between organic and inorganic plant fertilizers.			
3. Engage learners to compare the volumes of organic and inorganic nutrient source required by different plants			

Homework/project work/community engagement suggestions

Let learners do the following homework as contained in the Learner Pack B7.2.3.1.1

1. Make a list of organic plants nutrient sources.

2. Write down how plants absorb plant nutrients to promote growth and development.

3. Find out the professions that use plant nutrients in their activities.

Cross-curriculum links/cross-cutting issues

· In Agriculture and in green economy, knowledge of fertilizer use can help the learner to enhance plant growth for afforestation. Fertilizers help plant growers to maximise their crop yield on a specific piece of land.

Potential misconceptions/student learning difficulties

1. Nitrogen and phosphorus make plants grow, but when too much fertilizer is applied to the land, it runs off into our waterways causing water pollution.

2. Fertilizer alone cannot grow more food.

NB : Fertilizer is only part of a bigger solution that includes teaching farmers modern techniques and helping farming families sell (and eat) **more** nutritious **food**.

Strand 2 : Cycles			
Sub-Strand 3 : Crop Production			
Content Standard(s) B7.2.3.1 Demonstrate understanding of the different plant nutrients (organic, and inorganic fertilizers) and their application in school farming (school gardening)			
Indicator B7.2.3.1.2 Describe the physical characteristics of different plant nutrients (organic and inorganic) and how each is applied to plants in the field			
Key words/vocabulary: Organic, inorganic, fertilizer, plant nutrient, physical characteristics, school farming/gardening			
Suggested activities for learning and assessment **Let Learners:**	**Equipment/Resources**	**Learner Resource page ref**	**Progression**
1. Identify each plant nutrient source and explain how its physical structure and appearance affect its application using pictures and real samples of fertilizers.	**1.** Samples of fertilizers **2.** Videos **3.** Pictures **4.** Charts		**1.** Identification of plant nutrient source **2.** Describing in groups how types of nutrient source may be applied to plants. **3.** Demonstrating practical application of nutrient source to plants.
2. Describe in groups how each type of nutrient source may be applied to plants in the field (e.g. school garden). Let learners share their experiences in class during group discussions.			
3. Demonstrate practical application of each type of nutrient source to plants in the field (e.g. school garden). Engage them to share their ideas with each other.			
Homework/project work/community engagement suggestions			
1. Let learners do the following as homework. **1.** They should use internet/books/pictures/people in the community to find out more about plant nutrient source **2.** They should explain why plant nutrient source is important to plant growers. **3.** They should visit other farm yard gardens to see how the plant nutrients are used and write a page report of the visit and them write a description of how the plant nutrients are used.			
Cross-curriculum links/cross-cutting issues			
The use of the plant nutrients should not be too much to growing plants. If it is too much the plants will not be strong and healthy.			
Potential misconceptions/student learning difficulties			
How fertilizer is applied to plants may pose a challenge to learners so the learners may have to see you the teacher applies it to plants to avoid plants wilting as a result of putting the fertilizer close to the plant or seedling.			

STRAND 2 : CYCLES			
SUB-STRAND 4: ANIMAL PRODUCTION			
Content Standard(s) B7.2.4.1 Demonstrate understanding of the differences among domestic animals such as ruminants, monogastric and poultry (monogastric herbivore)			
Indicator: B7.2.4.1.1 Examine and list domestic animals in the community			
Key words/vocabulary: Domestic, Ruminants, Herbivore, Monogastric, Breeds			
Suggested activities for learning and assessment.	**Equipment/Resources**	**Learner Resource page ref**	**Progression**
1. Let learners go on nature walk with learners to identify different types of domestic animals in the community. Encourage learners to explain their observations and findings about domestic animals.	**1.** Pictures of animals **2.** Charts of animals **3.** Drawings of animals **4.** Real animals **5.** Videos of animals **6** Models of animals **7.** Cut-outs of animals		**1.** Going on natures walk and identifying types of animals. **2.** Matching animals with their breeds **3.** Discussing characteristics of animals for classification.
2. Let learners match different domestic animals with their breeds by using cut-outs and other related resources.			
3. Let learners discuss the characteristics, such as shape, colour, size, food/feeding and others, which can be used to classify domestic animals. **Note**: Do not use animals that are scary to learners.			
Homework/project work/community engagement suggestions			
Let learners do the following homework: **1.** Find out why domestic animals are important in the daily lives of humans. **2.** Make drawings of domestic animals and display your drawings for discussion in class.			
Cross-curriculum links/cross-cutting issues			
1. Some domestic animals are used for meat production in the meat industry **2.** People also use some domestic animals as pets. **3.** Physical Education and Health: Learners may use the characteristics of domestic animals to justify why some of them are used for sports. Pharmaceutical Industry: The learner will appreciate the use of some domestic animals for experiments for some vaccines.			
Potential misconceptions/student learning difficulties			
1. The use of domestic animals as pets depends on the cultural and individual differences of people. Domestic animals used as pets differ from one ethnic group to another. **2.** The consumption of domestic animals also varies from one ethnic group to the other and one religious group to the other.			

Strand 2: Cycles

Sub-Strand 4: Animal Production

Content Standard(s) B7.2.4.1 Demonstrate understanding of the differences among domestic animals such as ruminants, monogastric and poultry (monogastric herbivore)

Indicators B7.2.4.1.2 Show the differences among domestic animals.
B7.2.4.1.3 Show the differences and similarities among domestic animals.

Key words/vocabulary: Ruminants, domestic, monogastric, herbivore

Suggested activities for learning and assessment	**Equipment /Resources**	**Learner Resource page ref**	**Progression**
Let Learners:			
1. Identify characteristics/features of domestic animals	**1.** Pictures of animals **2.** Charts of animals **3.** Drawings of animals 4. Videos of animals **5.** Models of animals **6.** Cut-outs of animals		**1.** Identifying features of domestic animals. **2.** Classifying into ruminants, monogastrics and monogastric herbivores. **3.** Giving examples of animals classified as ruminants, monogastric herbivores. **4.** Differences among ruminants, monogastrics and monogastric herbivores.
2. Classify domestic animals into ruminants, monogastrics (non-ruminants) and monogastric herbivores			
3. Let learners give examples of animals classified as ruminants, monogastric, and monogastric herbivores **Note:** Use various creative pedagogies to help learners with the activities.			
4. Engage learners to write similarities in the nature and characteristics of ruminants, monogastric and monogastric herbivores in Ghana and other countries. **Note :** There are two indicators in this lesson. Follow the lesson **progression** to help you teach systematically			

Homework/ project work/community engagement suggestions

Let learners do the following as home work to be found in the Learners' Pack B7.2.4.1

1. Make drawings of domestic animals and display your drawings for discussion in class.
2. Identify the features of those domestic animals.
3. Describe domestic uses of monogastric herbivores.
4. Explain what will happen if there are no animals.
5. Find out more about animals that are not ruminants.

Cross-curriculum links/cross-cutting issues

1. Physical Education and Health: Learners can use their knowledge about ruminants and non-ruminants to justify why horses are use in racing as a sport

Potential misconceptions/student learning difficulties

Learners may carry misconceptions that horses are ruminants:

1. Educate learners that horses are not ruminants. Ruminants have four compartments within their stomach that digest their food in stages.
2. Horses only have one compartment in their stomach which means they do not fall within the ruminant category.

Strand 2 : Cycles

Sub-Strand 4: Animal Production

Content Standard(s) B7.2.4.2 Show understanding of the usefulness of the different types of animals for domestic and commercial purposes

Indicators B7.2.4.2.1 Discuss and write the domestic and commercial uses of different types of animals.
B7.2.4.2.2 Observe and compare the uses of the different types of animals.

Key words/vocabulary: Ruminants, monogastric, animal waste, domestic

Suggested activities for learning and assessment	Equipment/Resources	Learner Resource page ref	Progression
Let Learners:			
1. Search for information from people in the community, pictures, videos and other related resources describe how animals are used for domestic and commercial purpose. **2.** Explain the concepts of domestic use and commercial use of animals.	**1.** Pictures of animals **2.** Charts of animals **3.** Drawings of animals **4.** Videos of animals **5.** Models of animals **6.** Cut-outs of animals		**1.** Explaining domestic use and commercial use of animals. **2.** Describing domestic uses of ruminants, monogastrics and monogastric herbivores. **3.** Observing and discussing different uses of different animals found in the communities **4.** Matching the different domestic animals to their commercial uses including their by- products (such as animal waste).
3. Let learners describe domestic uses of ruminants, monogastrics and monogastric herbivores			
4. Engage learners to explore from nature walk to observe and discuss different uses of different animals found in the communities.			
5. Let learners list and match the different domestic animals to their commercial uses including their by-products (such as animal waste). Use cut-outs and other alternative creative pedagogies to support this activity to consolidate their understanding of domestic and commercial use of animals			

Homework/ project work/community engagement suggestions

Let learners do the following as homework

1. Explain the concepts of: domestic use and commercial use of animals.
2. Describe domestic uses of ruminants, monogastrics and monogastric herbivores.
3. Observe and discuss different uses of different animals found in the communities.
4. List and match the different domestic animals to their commercial uses including their by-products (such as animal waste).

Cross-curriculum links/cross-cutting issues

1. Not applicable

Potential misconceptions/student learning difficulties

1. Most learners are unfamiliar with the animal research process, and there are **misconceptions** about the way that **animals** are **used** in medical and scientific research.
2. Most animals that are used are not sold on commercial bases for consumption.

Strand 3: Systems			
Sub-Strand 1: The Human Body System			
Content standard: B7.3.1.1 Show an understanding of the concept of food , the process of digestion and appreciate its importance in humans			
Indicator(s) B7.3.1.1.1 Explain the concept of food and the needs for humans to eat			
Key words/Vocabulary : Carbohydrates, proteins, fats and oils, fibre, vitamins			
Suggested activities for learning and assessment.	**Equipment/Resources**	**Learner Resource page ref**	**Progression**
1. Let learners discuss what food is and mention the nutrients such as proteins ,vitamins, carbohydrate (starch and sugars), minerals etc.	Pictures of real food items e.g. meat, palm oil, cassava, animal fat etc.		**1.** Explanation of food and its importance. **2.** Nutrient identification in food. **3.** Discussion of the importance of food **4.** Comparing and contrasting starved and non-starved persons
2. Engage learners to identify food nutrients in common food substances such as cassava, bread, fats and oils. meat etc.	Charts of classes of food nutrients		
3. Put learners in groups or in pairs for them to discuss the importance of food.			
4. Let learners compare and contrast the appearance of people in pictures who have been starved with those who eat every day. • Ask learners to do group presentation based on their comparisons.	Pictures of lean and fat people		
Homework/project work/community engagement suggestions			
Let learners do the following as homework: **1.** Explain what food is. **2.** Identify food nutrients in the following: meat, orange, yam, "kontomire", water and palm oil. **3.** Write down four importance of food. **4.** Identify the minerals on athe following brands of bottled water (Standard, Voltic, Verna, Bell Aqua,) **NB: The minerals are listed on the labels of the bottle water.**			
Cross-curriculum links/cross-cutting issues			
Career technology: Learners will use their knowledge in nutrients to draw meals menu based on food nutrient requirement of persons			
Potential misconceptions/student learning difficulties			
The misconception that water is not food must be cleared; its nutrients are the minerals found in it.			

Strand3: Systems			
Sub-Strand 2: The Solar System			
Content standard: B7.3.2.1 Know the inner planets of the solar system and understand their movement in the system			
Indicator(s) B7.3.2.1.1 identify the inner planets of the solar system and describe their properties.			
Key words/Vocabulary: Satellites, Star, Planet, Mercury, Mars, Venus Earth, Revolution, Axis			
Suggested activities for learning and assessment.	**Equipment/Resources**	**Learner Resource page ref**	**Progression**
Let learners:			
1. Recall the names of the heavenly bodies such as satellites, star sand planets in the solar system from B6. **2.** Recall the names of the eight planets. **3.** Describe the features of each of the four inner planets. **4.** Show a video or use a chart to explain the positions and features of the inner planets. **5.** Assign learners to four groups each group must discuss about each of the four inner planets. **6.** Make group presentations on the following: **i.** Position of the planet from the sun; **ii.** Number of days it takes to revolve around the sun; **iii.** The length of day and night on the planet. **7.** Role play in groups of five the movements of the inner planets around the sun. **8.** Within the group , learners must play the role of one of the inner planets and describe the major features of the given planet. **9.** Make a design of the solar system using paper, cardboard, and counters. **10.** Display their work for inspection by friends and the teacher.	Charts and videos on the solar system Cardboards, pencils, pens, coloured pencils, rule and erasers.		**1.** Recalling names of the heavenly bodies **2.** Describing the features **3.** Role playing planetary movement **4.** Explaining the positions and features planets **5.** Group presentation **6.** Designing of the solar system
Homework/project work/community engagement suggestions			
Let learners do the following homework: **1.** Observe the appearance of some inner planets such as Venus and Mercury in the sky. **2.** Watch videos on the inner planets.			
Cross-curriculum links/cross-cutting issues			
In social studies, learners will use their knowledge the planetary system to guide when to carry out social activities such as farming and fishing			
Potential misconceptions/student learning difficulties Note that all the inner planets are solid in nature due to their closeness to the sun. • Learners may confuse some inner planets with stars in the night sky			

Strand 3: Systems			
Sub-Strand 3: Ecosystem			
Content standard: B7.3.3.1 Recognise the components and their interdependence in an ecosystem and appreciate their interactions			
B7.3.3.1. 1 Analyse the components of ecosystems and identify the interactions within.			
Key words/Vocabulary: Ecosystem, adaptation, terrestrial, aquatic, arboreal, habitat, biotic and abiotic			
Suggested activities for learning and assessment.	**Equipment/Resources**	**Learner Resource page ref**	**Progression**
Let learners:			
1. Describe an ecosystem as a self-sustaining unit in which components interact E.g. A pond, a forest and many others **2.** Go on a field trip or nature walk to observe animals in their natural home such as birds on a tree top, frogs and fish in a pond, grasshoppers in a grassland. **3.** Identify the components of the ecosystem that enables members to survive on their own. **4.** Match different plants and animals with the ecosystem that they are likely to be found by using lines drawn with freehand **5.** Explain how the function of each component within the ecosystem affect the other	Realia, videos cut-out pictures or cardboard inscriptions bearing the names of different organisms and different ecosystems on ecosystems Charts, cut-out pictures or cardboard inscriptions bearing the names of different organisms and different ecosystems pictures of ecosystems		
Homework/project work/community engagement suggestions			
Let learners do the following homework: **1.** Learners to visit ecosystems around their home to observe any commonalities and differences. **2.** Identify various ecosystems around the home and group them as aquatic, terrestrial or arboreal. **3.** Learners design an ecosystem in groups using materials such as clay, cardboard, wood.			
Cross-curriculum links/cross-cutting issues			
Computing: Learners will use the concept of computer system to understand ecological system			
Potential misconceptions/student learning difficulties • Some learners cannot distinguish between habitat and ecosystem. • Learners may not appreciate the role of some abiotic factors such as rocks within the ecosystem.			

Strand 3: Systems			
Sub-Strand 4: Farming Systems			
Content standard : B7.3.4.1 Demonstrate an understanding of the differences among the various farming systems: Land Rotation, Crop Rotation, Mixed Cropping, Mixed Farming, and Organic Farming			
Indicator(s): B7.3.4.1.1 Examine and discuss the differences among the various farming systems. **B7.3.4.1.2 Categorise different farming systems** **B7.3.4.1.3 Discuss the usefulness of different farming systems**			
Key words/vocabulary: Farming Systems, land rotation, crop rotation, mixed cropping, mixed farming, and organic farming			
Suggested activities for learning and assessment. **Let Learners**:	**Equipment/Resources**	**Learner Resource page ref**	**Progression**
1. Identify and define types of farming systems in Ghana and elsewhere. **2.** Discuss the characteristics of the different farming systems in Ghana. **3.** Compare and contrast the characteristics of the different farming systems. **4.** Classify different descriptions of farming systems under land rotation, crop rotation, mixed cropping, mixed farming and organic farming. **5.** Group farming systems prevailing in their community under land rotation, crop rotation, mixed cropping, mixed farming and organic farming. **6.** Discuss and tabulate the reasons behind the use of various farming systems. **7.** Debate the merits and demerits of the different farming systems.			**1.** Identifying farming systems **2.** Discussing the characteristics **3.** Comparing and contrasting farming systems **4.** Discussing and tabulating reasons for various farming systems **5.** Debating the merits and demerits of different farming systems
Homework/project work/community engagement suggestions			
Let learners: **1.** Engage their community members to examine and discuss the differences among the various farming systems in their communities **2.** Identify the types of farming that goes on in their communities and categorise them into the different farming systems in agriculture **3.** Discuss the usefulness of different farming systems			
Cross-curriculum links/cross-cutting issues			
Application of the knowledge of farming systems to agriculture will maximise crop and animal production in the community.			
Potential misconceptions/student learning difficulties			
The misconception of mixed farming should be addressed comprehensively since learners are likely to misconceive mixed cropping to be mixed farming. Mixed farming involves cultivation of crops and rearing of animals on the same farm.			

Strand 4: Forces and Energy

Sub-Strand 1: Energy

Content standard: B7.4.1.1 Demonstrate an understanding of forms of energy and their daily applications.

Indicator(s): B7.4.1.1.1 Identify the various forms of energy and show how they are related.

B7.4.1.1.2 Explain daily application of forms of energy.

Key words/vocabulary: Energy, kinetic energy, potential energy, heat energy, gravitational potential energy, sound energy, nuclear energy, forms of energy, mechanical energy, electrical energy, chemical energy.

Suggested activities for learning and assessment. **Let Learners**:	**Equipment/Resources**	**Learner Resource page ref**	**Progression**
1. List forms of energy in terms of potential, kinetic, heat, sound, solar, electrical, nuclear, chemical and light.	**1.** Pictures **2.** Videos **3.** Charts **4.** Different objects to be dropped		**1.** Listing forms of energy **2.** Describing how potential energy changes to kinetic energy factors that affect Potential and Kinetic energy **3.** Use mathematical expressions for both potential energy (PE = mgh) and kinetic energy (KE = ½ mv^2) and use the expressions to solve problems involving mechanical energy.
2. Drop objects from a height and describe how potential energy changes to kinetic energy. Learners share their observations from the activities by using diagrams	From heights.		
3. Demonstrate how Potential Energy (P.E) is related to Kinetic Energy (K.E) (Mechanical Energy= PE+ KE)			
4. Explain factors that affect Potential and Kinetic energy in their application in daily life.			
5. Use mathematical expressions for both Potential energy (P.E = mgh) and Kinetic energy (K.E = ½ mv^2) and use the expressions to solve problems involving mechanical energy.			
6. Discuss how forms of energy are used in daily life.			**4.** How forms of energy are used in daily life.

Homework/project work/community engagement suggestions

Let learners do the following as homework

1. A body of mass 14.0 kg is placed on an orange tree 17.0 m above the ground.
Calculate its potential energy with respect to the ground.
If the body is released from this height, what will be its kinetic energy just before it hits the ground [g = 10m/s^2].

2. The potential energy of a body 5 m above the ground is 200 J. Calculate the mass of the body if g = 10 m/$s^{2.}$

3. The body of mass 5 kg has a potential energy of 400 J. Calculate the height of the body above the ground if g = 10 m/$s^{2.}$

4. Explain how forms of energy are used in daily life.

5. Three objects X, Y and Z with masses 30 kg, 55 kg and 27 kg respectively are placed on top of a building of height 35 m from the ground. 6. 6. State with reasons, which of the objects:

i. Has the least potential energy?

ii. Has the greatest potential energy?

iii. Will have the greatest kinetic energy when rolled to fall?

5. In groups research and do a presentation about how potential energy is related to kinetic energy

Cross-curriculum links/cross-cutting issues

In science the potential energy in food which when used enable a person to build some energy that is required to do work changes from potential to kinetic.

Potential misconceptions/student learning difficulties

Energy cuts across all the disciplines of science e.g. Physics, Chemistry, and Biology. Explain to learners that energy is applied in all these disciplines.

Strand 4: Forces and Energy			
Sub-Strand 1: Energy			
Content standard: B7.4.1.2 Demonstrate an understanding of the concept of heat transfer and its applications in life.			
Indicator: B7.4.1.2.1. Explain and demonstrate how heat is transferred in various media.			
Key words/vocabulary: Energy, appliance, gadget, factors			
Suggested Activities for learning and assessment	**Equipment/Resources**	**Learner Resource Page Ref**	**Progression**
Let learners perform the activities below			
1. Provide learners with hot water in cups or containers. **2.** Supply them with metallic, plastic and wooden spoons per group. **3.** Let learners feel the temperature of the spoons **4.** Then let them place the spoons in the hot water and feel the temperature after every two minutes for 10 minutes and record their observations. **5.** In groups they should explain how the heat is transferred. **6.** Discuss how heat is transferred through gas. **Note: Ensure that the hot water does not spill over the learners.**	**1.** Hot water, **2.** Cups/containers, **3.** Plastic, metallic, and wooden spoons.		Finding out how heat is transferred through various media and Explaining how the transfer was done
Homework/project work/community engagement suggestions			
Let learners do the work below as home work: **1.** Explain why some cooking utensils and cutlery have wooden or plastic-like handles.			
Cross-curriculum links/cross-cutting issues			
The learners knowledge about bad conductors of heat will enable them appreciate why some spoons and ladles have wooden handles.			
Potential misconceptions/student learning difficulties			
Career Technology: Learners will use the knowledge of different rates of heat conductivity to make the right choice of materials for designing objects for use.			

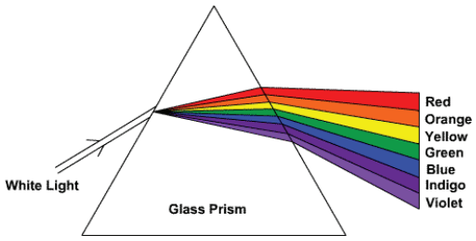
Strand 4: Forces and Energy

Sub-Strand 1: Energy

Content standard: B7.4.1.3 Demonstrate an understanding of characteristics of light, such as travelling in a straight line, reflection, refraction and dispersion

Indicator: B7.4.1.3.1 Demonstrate how light travels in a straight line

Key words/vocabulary: Dispersion, reflection, refraction glass prism, spectrum, light,

Suggested activities for learning and assessment.	**Equipment/Resources**	**Learner Resource page ref**	**Progression**
Let learners:			
1. Perform experiments to show that light travels in a straight line using card boards with holes through them and a source of light **2.** Use a plane mirror and source of light to demonstrate reflection of light. **3.** Carry out a experiment using a glass prism and a source of light to show dispersion of light into colours as shown in the figure below.  **4.** Use dispersion of light to explain refraction of light and its application in everyday life. **NB : You can use any other appropriate approach to demonstrate all the activities with your learners.**	**1.** Three card boards with holes at the center and a source of light (a lamp) **2.** Triangular prism, a narrow beam of light, a screen **3.** Water, a small jar with a lid, soap		**1.** Performing experiments to show light travels in a straight line **2.** Demonstration of reflection of light **3.** Demonstration of dispersion of light

Homework/project work/community engagement suggestions

Let learners do the work below as homework

1. Explain the difference between reflection, refraction, and dispersion of light.

2. Use a ray diagram to show the path of light traveling from air into water.

Cross-curriculum links/Cross-cutting issues:

Knowledge about light will enable learners understand that light is the source of energy in an ecosystem.

Potential misconceptions/student learning difficulties

White light is a pure and colorless light.

Strand 4: Forces and Energy			
Sub-Strand 2: Electricity and Electronics			
Content standard: B7.4.2.1 Demonstrate understanding of forms of electricity, its generation and effects on the environment			
Indicator: B7.4.2.1.1 Describe the various forms of electricity generation **B7.4.2.1.2 Explain the impact of electricity generation on the environment.**			
Key words/vocabulary: Thermal energy, nuclear energy, electricity, environment, hydro , wind power, photo voltaic, reactor,			
Suggested activities for learning and assessment.	**Equipment/Resources**	**Learner Resource page ref**	**Progression**
Let learners:			
1. Search for and discuss information about the nature and generation of thermal and nuclear electricity and produce report, charts, diagrams etc. **2.** Debate in groups the negative effects of both thermal and nuclear electricity generation on the environment and show how to reduce the effects. **3.** Create posters and leaflets of the outcome of the debate. **NB: Learners should be to be told before the lesson to search for information about thermal and nuclear electricity generation using the resources indicated in the resources column.**	**1.** Charts **2.** diagrams **3.** Internet **4.** You tube **5.** PHET Stimulations **6.** Science text books **7.** Science journals		**1.** Discussing nature and generation of thermal and nuclear electricity **2.** Debating the effects of the generation on the environment **3.** Creating posters and leaflets effects of the generation of the electricity on the environment
Homework/project work/community engagement suggestions			
Let learners do the work below as homework as referred in the Learners Pack B7.4.2.1.1 and B7.4.2.1.2 **1.** (a) Find information about the generation of thermal and nuclear electricity from teachers, books, internet, and parents (if possible). (b) Which of the two has a greater effect on the environment? Explain your answer.			
Cross-curriculum links/cross-cutting issues			
The learners will know from the study of the generation of thermal and nuclear electricity the type of electricity generation that will be more desirable for communities.			
Potential misconceptions/student learning difficulties			
Some of the misconceptions about nuclear energy are extremely detrimental. One of the most impacting is that if there is a plant failure, it could kill a large amounts of people. Explain to learners that nuclear power has one of the highest safety records in the world compared to other sources of energy.			

Strand 4: Forces and Energy			
Sub-Strand 2: Electricity and Electronics			
Content Standard: B7.4.2.2 Demonstrate knowledge of how to assemble and explain the functions of basic electronic components and their interdependence in an electronic circuit.			
Indicators: B7.4.2.2.1 Demonstrate how to assemble basic electronic components **B7.4.2.2.2 Discuss the function of each electronic component and their interdependence with each other** **B7.4.2.2.3 Discuss the function of each electronic component such as capacitor, resistor, diode, and. inductor and their interdependence for the functioning of an electronic gadget**			
Key Words/Vocabulary: Electronic, Diode, Capacitor, Resistor, Inductor, Gadget, Light emitting diode			
Suggested activities for learning and assessment.	**Equipment/Resources**	**Learner Resource page ref**	**Progression**
Let learners:			
1. Examine electronic components such as types of LEDs, P-N Junction diodes, colour code resistors and capacitors, and arrange them in an electronic circuit. **2.** Dismantle and assemble spoilt electronic gadgets such as radio, TV, mobile phones, electronic watch and others that can be found in the home and at school. **3.** Identify the Positive (P) region and Negative (N) region of the P-N junction diode and construct a simple electronic circuit comprising a 3V battery made of two dry cells in series with a switch and an LED. **4.** Explain what happens to an LED when the switch in an electronic circuit is closed and opened. NB : Engage learners to come out with professions that use knowledge of electronics.	Diode, Capacitor, resistor, inductor, gadget, LEDs		**1.** Examining electronic components **2.** Identifying the regions of P-N Junction **3.** Constructing an electronic circuit **4.** Explaining the behaviour of an LED in open and closed circuits
Homework/project work/community engagement suggestions			
Let learners carry out the following projects and present a report: **1.** Construct an electronic circuit to create a lantern using a plastic bottle. **2.** Produce an electronic toy using available materials in the environment.			
Cross-curriculum links/cross-cutting issues			
Career Technology: Learners can use the electronic circuit construction to design and produce toys			
Potential misconceptions/student learning difficulties			
Learners may misconceive electricity as same as electronics. Electrical energy can change into other forms but electronics deals with the control of the flow of electrons to perform a task.			

Strand 4: Forces and Energy			
Sub-Strand 3: Conversion and Conservation of Energy			
Content standard: B7.4.3.1. Demonstrate an understanding of the principle of conservation and conversion of energy and their application in real life situations			
Indicators: B7.4.3.1.1 Explain the principle underlying conservation and conversion of energy. **B7.4.3.1.2 Demonstrate the conversion of energy into useable forms.** **B7.4.3.1.3 Know how energy could be conserved for future use in life.**			
Key words/vocabulary: Conversion, transformation, useable , conservation			
Suggested activities for learning and assessment.	**Equipment/Resources**	**Learner Resource page ref**	**Progression**
Let learners perform the following activities			
Activity 1: **1.** Put batteries in a torch. **2.** Switch on the torch and observe what happens to the bulb. **3.** Remove one dry cell and repeat the experiment. **4.** Observe what happens and explain the two observations. **Activity 2:** **1.** Turn on a radio. **2.** Place your hand on the speaker and observe what happens. **a.** Let learners use the concept of energy conversion to explain their observations. **Activity 3:** **1.** Demonstrate with diagrams everyday use of conversion of energy to other forms. **2.** Describe how energy is conserved and explain how it can be done for the benefit of humans and other life forms. c. NB : Relate the lesson to real life situations.	**1.** Batteries **2.** Torch **3.** Switch **4.** Radio **5.** Charts and drawings showing energy conversion.		**1.** Demonstrating the effect of dry cells on a bulb when an electrical circuit is complete. **2.** Demonstrating that electrical energy can be converted to sound energy.
Homework/project work/community engagement suggestions			
Let learners do the following work as homework: **1.** Find information about energy conservation and energy conversion, and explain the scientific principle underlying them. **2.** Engage their family and community members to collect their views on how they can conserve energy for future use. Let them develop a write up on the views collected.			
Cross-curriculum links/cross-cutting issues			
Social Studies and Career Technology: Learners will use the knowledge of conservation and conversion of energy to appreciate the need for conscious effort to regulate the use of energy in their communities especially in Career Technology where they use most forms of energy for cooking and designing.			
Potential misconceptions/student learning difficulties			
Some learners hold the perception that force is needed to keep an object in motion and that a moving object stops when its force is used up. **1.** 'An object at rest has no energy' - Explain to learners that object at rest also has energy. **2.** Explain to learners that energy is not associated to only movement.			

Strand 4: Forces and Energy

Sub-Strand 4: Force and Motion

Content standard: B7.4.4.1 Examine the concept of motion , Newton's first Law of motion , magnetic force in relation to motion and understand their applications to life.

Indicator: B7.4.4.1.1 Understand that unbalanced forces acting on an object cause it to move.

B7.4.4.1.2 State and explain Newton's First Law of motion.

B7.4.4.1.3 Examine the application of Newton' First Law of Motion in life.

B7.4.4.1.4 Demonstrate the behaviour of magnets and its use to life.

Key words/vocabulary: Newton's first law, velocity, acceleration , force, reaction force, weight, unbalanced force, motion, inertia, resist motion,

Suggested activities for learning and assessment	Equipment/Resources	Learner Resource page ref	Progression
1. Engage learners to push small and big objects in around the classroom or spin boiled and unboiled eggs on a flat surface and use their observation to explain unbalanced forces and inertia.	**1.** Bar magnets **2.** Metallic and non-metallic substances **3.** Balls **4.** Eggs **5.** Threads **6.** Small and big objects.		**1.** Meaning of unbalanced forces **2.** Newton's First Law of Motion and its application. **3.** Magnetic and non-magnetic) substances . **4.** The uses of magnets. **5.** Finding information about Newton's first law of motion **6.** Discussing Newton's First Law of Motion for consolidating understanding **7.** Demonstrating practically Newton's First Law of Motion **8.** Demonstrating magnetic force acting on materials **9.** Demonstrating the N-S direction of bar magnets when they are suspended
2. Ask learners to find information about Newton's First Law from books, internet science journals, or and science educators .			
3. Engage learners to discuss their understanding of Newton's First Law of Motion.			
4. Let learners give a slight push to metallic balls, football, round objects on smoothed surfaces e.g. cement floor, assembly ground or whichever is applicable and use their observations to explain application of Newton's First Law of Motion.			
5. Engage learners to discuss the use of seat belts as an application of Newton's First Law of Motion to protect humans from hitting themselves on objects when vehicles jerk.			
6. Let learners perform activities involving the use of a magnet to attract and repel materials (magnetic and non-magnetic) substances and write their observations. Discuss with learners the uses of magnets.			
7. Let learners suspend two bar magnets on threads, observe what happens and record their observations. NB: You can use an alternative approach to perform the activities.			

Homework/project work/community engagement suggestions

Let learners do the assignment provided in the Learners Pack B7.4.4.1

Cross-curriculum links/cross-cutting issues

Learners should know from the study of forces that for any object to move, forces must act on the object.

Potential misconceptions/student learning difficulties

The everyday use of " force" must be distinguished from its use in Science

Strand 4: Forces and Energy			
Sub-Strand 4: Force and Motion			
Content standard: B7.4.4.2 Recognise some simple machines, and their application in doing work			
Indicators: B7.4.4.2.1 Identify simple machines. **B7.4.4.2.2 Describe the types and functions of levers.** **B7.4.4.2.3 Know Work Input, and Output and Efficiency as they apply to machines.**			
Key words/vocabulary: Pulley, lever, machine, efficiency, fulcrum , force, weight , moments, watts, work input, work, output			
Suggested activities for learning and assessment.	**Equipment/Resources**	**Learner Resource page ref**	**Progression**
Let learners:			
1. Describe simple machines. **2.** Explain what levers are and how they function as simple machines. Name the types of levers and give an example of each type. **3.** Demonstrate the principles involved in each class of levers that make work easier in everyday life. **4.** Explain the terms work input, work output and efficiency. **5.** Explain efficiency of a machine as the ratio of work output to work input expressed as a percentage. **6.** In groups describe how efficiency of simple machines can be improved (e.g. by oiling its parts to reduce friction).	Seesaw, crowbar, a pair of scissors, wheel barrow, shovel, spoon, pliers, knife		**1.** Description of simple machine **2.** Explanation of levers and how the function **3.** Demonstrating the principles upon which classes of levers work to make work easier.
Homework/project work/community engagement suggestions			
Let learners do the following as homework to consolidate their understanding of levers as simple machines **1.** Explain how levers function as simple machines.			
Cross-curriculum links/cross-cutting issues			
In industry, home and school, learners' knowledge of levers will be applied to do work easily.			
Potential misconceptions/student learning difficulties			
A greater force on a mechanism always has a greater effect on the object. In fact, a mechanism can allow a smaller force to have a greater effect.			

Strand 4: Forces and Energy			
Sub-Strand 5: Agricultural Tools			
Content standard: B7.4.5.1 Demonstrate knowledge and skills in handling and maintenance of basic and simple agricultural tools			
Indicator(s): B7.4.5.1.1 Explain the basic rules in handling and maintaining simple agricultural tools. **B7.4.5.1.2 Apply the handling and maintenance of basic and simple agricultural tools in their community**			
Key words/vocabulary: Skill, maintenance, tool, community			
Suggested activities for learning and assessment.	**Equipment/Resources**	**Learner Resource page ref**	**Progression**
Let learners:			
1. List some simple or basic farm tools in agriculture **2.** Discuss the meaning and importance of handling and maintenance of agricultural tools **3.** List and match the basic rules in handling and maintenance of tools with specific simple tools used in agriculture. **4.** Describe how handling and maintenance of simple and basic agricultural tools are done. **5.** Observe and discuss the handling and maintenance of basic and simple agricultural tools used in farms visited in the community and write a report. **6.** Assemble agricultural tools from the community and practice handling the tools to perform simple agricultural operations. **7.** Assemble agricultural tools from the community and practice basic rules in tools maintenance. Make an album of the activity.	Realia of simple agricultural tools		**1.** Listing some simple **2.** Discussing importance of handling agricultural tools **3.** Practising handling of agricultural tools **4.** Practising basic rules in agricultural tools maintenance
Homework/project work/community engagement suggestions			
Let learners do the following work as homework: **1.** Carry out a community survey of farmers to find out how they handle and maintain their agricultural tools.			
Cross-curriculum links/cross-cutting issues			
The study of agricultural tools will help learners to apply the knowledge of basic handling and maintenance of simple agricultural tools at home a school and in their communities.			
Potential misconceptions/student learning difficulties			
Learners may misconceive simple agricultural tools as sophisticated implements. But the agricultural tools can be as simple as cutlass, hoe sickle, etc.			

Strand 5: Humans and the Environment

Sub-strand 1 : Waste Management

Content standard: B7.5.1.1 Exhibit knowledge and skill of scientific basis for management practices of types of waste in the environment

Indicator(s): B7. 5.1.1.1 Apply information from research on good management practices of waste to make the environment clean

Key words/vocabulary: Waste disposal**,** refuse**,** residue, metal scraps, septic tank sludge, etc.

Suggested activities for learning and assessment. **Let Learners:**	**Equipment/Resources**	**Learner Resource page ref**	**Progression**
1. Research for information from books, and internet on good waste management practices and use it to carry out a project to make their environment clean.	Internet search Environmental Science Textbooks Environmental Protection Agency (EPA) websites Non-Governmental Organisations in environmental research. Projector		**1.** Research for information on waste management practices. **2.** Research report **3.** Discussing types of community waste. **4.** Discussing waste management and the science underlying it.
2. Write a report for presentation on the outcome of the project carried out.			
3. Discuss the types of waste generated in communities.			
4. Discuss how to manage types of waste and explain the science underlying it.			

Homework/project work/community engagement suggestions

Let learners do the following as homework and project at the end of the questions. Let them refer to the Learners' Pack for instructions: B7.5.1.1

1. What is waste?

……

……

2. Where does waste come from?

……

3. What are some of the types of waste generated in Ghana?

……

……

……

4. Are there ways you can reduce your waste at home? If so, how?

……

……

……

……

……

5. Make a poster to show waste management practices they can adopt to keep their environment clean.

6. Write a plan to practice waste management and write a report of your practices.

Project

Learners to make a poster to show waste management practices they can adopt to keep their environment clean.

Learners to write a project plan to practice waste management.

Cross-curriculum links/cross-cutting issues

Social Studies: The learner will use the knowledge of waste management to explain the need for communities to keep their environment clean

Potential misconceptions/student learning difficulties

Explain the term management as getting something under control.

Strand 5: Humans and The Environment

Sub-strand 2: Human Health

Content standard: B7.5.2.1 Demonstrate knowledge of common deficiency diseases of humans, their causes, symptoms, effects and prevention

Indicator(s): B7. 5.2.1.1 Explain the relationship between food nutrients and common deficiency diseases and how they affect humans

Key words/vocabulary: nutrients, carbohydrates, protein, fatty acids, vitamins, deficiency, symptoms, rickets, scurvy, kwashiorkor.

Suggested activities for learning and assessment.	**Equipment/Resources**	**Learner Resource page ref**	**Progression**
1. Engage learners in a think-pair-share to name foods they eat and analyse food nutrients such as carbohydrates, proteins, fatty acids, and their uses in the human body.	Food samples: (rice, gari, groundnuts, beans, fish, water) Projector Videos Pictures Internet searches		**1.** Naming food nutrients. **2.** Deficiency diseases associated with lack of food nutrients. **3.** Symptoms, effects and prevention of common deficiency diseases. **4.** Connections of deficiency diseases to everyday life.
2. Have learners discuss and make presentations in groups on deficiency diseases associated with lack of food nutrients such as carbohydrates, proteins, fatty acids, vitamins and others in the human body.			
3. Let learners relate the nutrients they gain or lack from the foods they normally eat.			
4. Have learners explain symptoms, effects and prevention of common deficiency diseases such as night blindness, rickets, scurvy, kwashiorkor and others in groups			
5. Let learners relate the lesson to everyday life to understand why children or people suffer from food/nutritional diseases.			
6. Have learners discuss food nutrients and their relationship to deficiency diseases.			

Homework/project work/community engagement suggestions

Let learners do the homework and project below:

Home Work:

1. Write the nutrients found in food.

2. Under each nutrient, write as many good sources of the nutrients.

Project Work:

1. Design a Pocket Guide to promote healthier choices when eating fast food. Task learners to lay out their design in a format that could be printed as a small pamphlet. Your goal is to design a guide that has highest nutritional value and are appealing to teens.

Cross-curriculum links/cross-cutting issues

Career Technology: Learners' knowledge of food nutrients can be used to draw a menu for feeding a group of people. Knowledge about food nutrients will enable the learner to prevent deficiency diseases in everyday life.

Potential misconceptions/student learning difficulties

- Learners must know that water which is treated for community use contains traces of mineral salts. Whiles water which is treated for laboratory analysis (distilled water does not contain any trace of mineral salts).
- Learners need to eat a balance diet every day to prevent deficiency diseases.
- The misconception that deficiency means lack of nutrients is wrong but it is the lack of a particular nutrient in the diet.

Strand 5: Humans and the Environment

Sub-strand 2: Human Health

Content standard: B7.5.2.2 Demonstrate knowledge of the nature of selected viral, diseases of humans, their causes, symptoms, effects and management

Indicator(s): B7. 5.2.2.1 Explain the nature of viral diseases with special emphasis on corona virus (COVID-19) /ebola/H1N1 disease its causes, symptoms, effects on humans and its prevention

Key words/vocabulary: corona virus, symptoms, management, ebola, H1N1,

Suggested activities for learning and assessment.	Equipment/Resources	Learner Resource page ref	Progression
1. Engage learners in a think-pair-share to discuss the nature of viral diseases.	Audio visual reports from the media (E.g. national and international TV stations). Projector Videos Pictures Internet searches		**1.** Discussions on viral diseases (E.g. covid-19, ebola and H1N1). **2.** Information on covid-19 i.e. mode of transmission of the of covid- 19, ebola and H1N1. **3.** Description of symptoms, effects and prevention of covid-19, ebola and H1N1 **4.** The role of individuals, community members and government officials.
2. Let learners search for information and make presentations on the corona virus disease (COVID -19), ebola, and H1N1 diseases their mode of transmission from person to person, community to community and from country to country.			
3. Engage learners to describe the symptoms, effects and prevention of covid-19), ebola, and H1N1 diseases and why they are declared pandemic and epidermic.			
4. Have learners describe the role of individuals, community members and government in managing covid-19 , ebola, and H1N1 diseases.			
5. Engage learners to design and produce a poster to educate their community members on the incidence and control of named viral diseases: covid-19, ebola, and H1N1.			

Homework/project work/community engagement suggestions

Let learners do the homework and project below:

Home Work:

1. Write down the viral diseases that are pandemic in nature.

2. Write the name of the viral disease that is epidemic in nature.

3 Describe the symptoms, effects and prevention of covid-19), ebola, and H1N1 diseases and write why they are declared pandemic and epidemic.

Project Work:

1. Design a viral response health guide to promote healthier living free of viral infections from person to person, community to community and from country to country.

Cross-curriculum links/cross-cutting issues

- Career Technology: Learners' knowledge on food nutrients can be used to plan and eat diets that can boost a person's immune system.

Potential misconceptions/student learning difficulties

- The misconception that all victims for covid-19 die is not true. There are recovery rates.
- Misconception that the use of "akpeteshie"(a local gin) to wash hands sanitises the hands or drinking it prevents contracting it.

Strand 5: Humans and The Environment			
Sub-Strand 3: Science and Industry			
Content standard: B7.5.3.1 Realise how careers in science can improve life of humans and research about Ghanaian and internationally recognised scientists and science educators and model after them			
Indicator(s): B.7. 5.3.1.1 Discover and explain how careers in science can improve human conditions and relate these careers to the work of great national and international scientists and science educators			
Key words/vocabulary: pharmacist, pilot, electrical engineer, research scientist, Biologist (ecologist, zoologist, botanist, entomologist, ethologist, etc.) Chemistry (forensic scientist, geochemist, hazardous waste chemist, material scientist). Physics (laser engineer, systems analyst, software engineer).			
Suggested activities for learning and assessment.	**Equipment/ Resources**	**Learner Resource page ref**	**Progression**
1. Engage learners to mention the type of career they wish to take up in future.	Videos, Pictures, Text books, Internet search		**1.** Naming future careers .
2. Let learners describe the various careers in science and relate them to the work of national scientist e.g. Prof. Ibok Nsa Oduro, Prof. Francis Allotey Professor Ewurama Addy, and science educationists: Professor Anamuah-Mensah, Professor Theophilus Ossei-Anto, Professor Christian Anthony-Krueger and others in groups.			**2.** Description of careers in science with linkages to Ghanaian and international scientist
3. Let learners describe various careers in science and relate them to the work of international scientists: Albert Einstein, Alexander Fleming, Charles Darwin, Paul Ratnei, Stephen Hawkins etc through group presentations.			**2.** Impact of science, technology and innovation in communities.
4. Let learners explain the impact of science, technology and innovation in homes, schools, communities and the universe and create interest for learners to research for information to build portfolios.			**3.** Science and technology careers Ghana could focus on.
5. Let learners identify the science and technology careers that Ghana must focus on and explain their reasons in groups.			
6. Let learners relate the lesson to everyday life to understand why Ghana should focus on specific science and technology careers.			
7. Let learners discuss how careers can improve human conditions.			
Homework/project work/community engagement suggestions			
Let learners do the homework below: **Homework**: **1.** Name and write five science-related careers you can identify in your community. **2.** Write the impact of the careers you have named in your community. **Project Work**: You will design a career brochure to showcase five more careers that you think Ghana can focus on to improve science, technology and innovation.			
Cross-curriculum links/cross-cutting issues			
• Knowledge of careers in science is linked to Mathematics, Career Technology, Creative Arts, Physical Education and Health. • Knowledge about careers in science will create more opportunities for learners to enter into other science-related careers to impact society.			
Potential misconceptions/student learning difficulties			
• Some learners have a misconception that some aspects of science (E.g. Physics and Chemistry) are difficult to understand and also certain careers are solely for males. No career has been branded as that for males or females. All learners can enter into any career provided the interest is there. • Learners need to eat a balance diet everyday to stay away from deficiency diseases.			

Strand 5: Humans and The Environment

Sub-Strand 4: Climate Change and Green Economy

Content standard: B7.5.4.1 Demonstrate understanding of sustainable energy choices and their impact on the environment

Indicator(s): B7.5.4.1.1 Search for information on ways sustainable energy choices and scientific ideas are used to protect the environment.

Key words/vocabulary: Green House Effect, Carbon dioxide, Weather, Climate, Sustainable Energy, Environment, Scientific Process, Climate Change

Suggested activities for learning and assessment.	**Equipment/Resources**	**Learner Resource page ref**	**Progression**
1. Engage leaners in groups to describe and discuss how people use sustainable energy choices and scientific ideas to protect the environment.	Videos Pictures Text books Internet search Local material for projects (E.g. Plastic bottles, etc.)		**1.** Describing sustainable energy choices. **2.** Analyse green house effect and global warming on the environment. **3.** Explain concept of weather and climate **4.** Relating energy choices to individual role in sustaining environment. **5.** Showing how energy is locally sustained through scientific processes in projects.
2. Let learners in groups use information from the internet, people in the community and other relevant learning resources to analyse the greenhouse effects and climate change on the environment and show how their effects can be minimized.			
3. Let learners in groups explain concepts such as weather and climate and relate them to the current changes in weather.			
4. Let learners discuss "greenhouse effect" to show linkages to the roles they need to play to sustain the environment.			
5. Let learners discuss ways sustainable energy choices and scientific ideas are used to protect the environment.			N/A

Homework/project work/community engagement suggestions

Let learners do the following Home Work and the project that follows:

Explain the following terms:

1. Sustainable energy choice
2. Green house effects
3. Climate change

Project Work: Design a project to show how energy can be locally sustained through the use of scientific processes to protect the environment.

Cross-curriculum links/cross-cutting issues

- Social Studies: Learners knowledge of sustainable energy choices and climate change issues (E.g. green house effects and global warming) can be used to practice sustainable socially responsible behaviour to the environment.
- Sustainable energy choices will reduce energy consumption and challenge the youth to look out for innovative and alternative energy choices that can serve the environment.

Potential misconceptions/student learning difficulties

Student learning difficulties: Greenhouse effect **and** global warming concepts should be taught using more videos to suppress learning difficulties.

Strand 5: Humans and The Environment			
Sub-Strand 5: Understanding the Environment			
Content standard: B7.5.5.1 Demonstrate understanding of different plants and animals found in different land forms and how they survive			
Indicator(s): B7.5.5.1.1 List and describe the different types of plants and animals that live in different land forms such as plateau plain, mountain valley and others			
Key words/vocabulary: fox, lion, tiger, snake, deer, grey wolf, habitat, mutualism, commensalism, parasitism, symbiosis, land form			
Suggested activities for learning and assessment.	**Equipment/Resources**	**Learner Resource page ref**	**Progression**
1. Engage learners in groups to identify different types of plants and animals found in different landforms using information from the internet, people from the community, books, pictures and any available source	Videos Pictures Text books Internet search		**1.** Internet search for plants and animals in different landforms. **2.** Description and characteristics of animals in different land forms. **3.** Description and characteristics of plants in different land forms. **4.** Communicating new understanding to relate to plants and animals in communities. **5.** Demonstrating understanding of new concept.
2. Let learners describe the characteristics that enable different types of animals to live in different landforms.			
3. Let learners describe the characteristics that enable different types of plants to survive in different landforms and have learners search for information to find out more about plants living in diverse land forms.			
4. Let learners mention a plant or animal found in a plateau, forest, valley or mountain region or area.			
Homework/project work/community engagement suggestions			
• **Let learners do the Homework below**: • 1. Name three animals and plants that are found in forest landforms. • 2. Describe any three characteristics of animals found in forest land forms.			
Cross-curriculum links/cross-cutting issues			
• Knowledge of animals and plants found in different land forms are linked to career technology and social studies. In career technology plants that are edible can be studied and used in in the food industry to make species. Before the lesson is taught, the teacher should contact the social studies teacher to check if important of plants have been taught, if not use what learners' already know about it. • Sustainable energy choices will reduce energy consumption and challenge the youth to look out for innovative and alternative energy choices that can serve the environment.			
Potential misconceptions/student learning difficulties			
Student learning difficulties: Plants and animals in different land forms should be taught using more videos to suppress learning difficulties.			

Strand 5: Humans and the Environment			
Sub-Strand 5: Understanding the Environment			
Content standard: B7.5.5.1 Demonstrate understanding of different plants and animals found in different land forms and how they survive			
Indicator(s): B7.5.5.1.2 Explain the nature of associations that exist among plants and animals in different landforms and their mechanisms for survival			
Key words/vocabulary: habitat, predators, adaptation, ecosystem, mutualism, etc			
Suggested activities for learning and assessment	**Equipment/Resources**	**Learner Resource page ref**	**Progression**
1. Let learners explore information from the internet and other sources in groups to come out with names of plants and animals in different landforms	Plants and animals seen in their natural environment in forest regions. Educational visits to Kakum and Damango national parks Videos Pictures Text books Internet search		**1.** Explore names of plants and animals in different landforms. **2.** Describe the nature of associations: mutualism, parasitism, commensalism, etc. **3.** Effects of biological associations within different land forms.
2. Let learners describe the nature of associations such as mutualism, parasitism, commensalism among plants and animals.			
3. Let learners explain the effects of the associations and carry out research for information about the different ways that different plants and animals survive in the landforms in which they are found.			
4. Let learners write about what they have learnt for the session about plant and animal associations.			
Homework/project work/community engagement suggestions			
Let learners do the homework below **Homework**: **1.** What associations exist between plants and animals in different land forms? **2.** Describe four of the association mentioned in 1. **3.** How do animals and plants associate in different landforms?			
Cross-curriculum links/cross-cutting issues			
• **Cross-curriculum links:** Social Studies: Learners can use their knowledge of animals and plants associations to illustrate associations in communities. • **Cross-cutting issues:** Knowing about plant and animal associations will enable the youth to know the importance of protecting plants and animal life to sustain the environment. • Sustainable energy choices will reduce energy consumption and challenge the youth to look out for innovative and alternative energy choices that can save the environment.			
Potential misconceptions/student learning difficulties			
The concept of association must be made clearer by stressing the relationships that exist among plants **Student learning difficulties:** Plants and animal associations should be taught using more videos to enhance the understanding of difficult concepts.			

APPENDICES

Appendix A: GUIDELINES FOR THE FORMATION OF PROFESSIONAL LEARNING COMMUNITIES (PLCs)

The National Council for Curriculum and Assessment (NaCCA), as part of the strategies for an effective implementation of the Common Core Programme Curriculum for Basic 7 (JHS1) – Basic 10 (SHS1) has come out with guidelines for the formation of Professional Learning Communities (PLCs).

FORMATION OF PROFESSIONAL LEARNING COMMUNITIES (PLCs)

The focus of education in recent times has been on *transformation.* Currently, most countries are shifting from block scheduling to tele-collaborative projects, from discovery learning to authentic assessment, etc. In realising these transformation agenda, new ideas for efficient education delivery and best performance attainment levels come and fade away or metamorphose into other models. One of these is the concept of Professional Learning Communities (PLCs). This has taken the central stage in most advanced countries in their quest for making education delivery robust and responsive in meeting their developmental needs. Ghana is no exception.

An article published by *Glossary of Education Reform* describes the professional learning community (PLC), as a group of educators that meets regularly, shares expertise, and works collaboratively to improve teaching skills and the academic performance of learners." According to Hord (1997b), "professional learning community is seen as a powerful staff-development approach and a potent strategy for school change and improvement." A PLC is a learning approach where teachers are activated as learning resources.

Generally, PLCs are considered as collegial groups of administrators and school staff who are united and committed to learners' learning. They function as an effective strategy for building school capacity around core issues of teaching and learning (Darling-Hammond, 1995). They serve as a mechanism to transform school culture. In other words, PLCs connect teachers with information, strategies, and best practices.

How is PLC formed?

- The head-teacher through consultation with his/her teachers and the major stakeholders (PTA, SMC, school improvement support officer (SISO), the education directorate, etc.) puts a committee in place.
- The committee is headed by a ***curriculum lead*** who must be a staff of the school.

What are the terms of reference of the committee?

The PLC in consultation with the entire membership and other stakeholders:

- agrees on the PLC session (or meeting) schedules for the term;
- identifies for PLC sessions, individual challenges in effective lesson delivery and innovative practices in teaching;
- creates common platform for members to share ideas, skills, knowledge and experiences;
- Identifies and invites facilitators for each session;
- Ensures that the focus of the school is changed from teaching to learning;
- Sets SMART goals for best practices in the school to meet expected performance outcomes and targets;

- collates data on all issues that relate to teaching and learning in the school for informed decisions;
- keeps records of attendance of members during PLC meetings;
- considers ways of changing the school's climate positively;
- plans and shares best practice lessons and integrated cross-curricular projects to all staff;
- creates a database on learner achievement scores that guides decisions for interventions;
- reviews and reflects on school data to plan instruction across the school curricular;
- considers extra-curricular experiences for learners.

What are some Characteristics of an Effective PLC?

- Shares values and norms.
- Creates time for collaborative work.
- Focuses collectively on learner's learning.
- Encourages collaborative work by creating common work spaces using proximity.
- Ensures leadership support for all PLC activities – school heads must be supportive.
- Respects and trusts one another.

What are the Guidelines for PLC's Activities?

- PLCs should be conducted once every week.
- The session should be for a minimum of one hour and should be set as the last hour of the day.
- The head of school will take the lead role.
- Roles should be assigned to encourage participation.
- The activities must focus on the Common Core Programme (CCP) Subjects-Curricula.
- The agenda for the next meeting should be developed at the end of each meeting for participants to prepare adequately for effective participation.

The minutes for each meeting should be made available after each session and sent to the regional PLC platform for headquarters' validation. The platform will be made up of the following officers from the Metropolitan, Municipal, District and Regional level:

- Training Officers
- Supervision and Monitoring (S&M) Officers
- Basic School Coordinators
- Heads of School
- School Improvement Support Officers (SISOs)
- Curriculum Leads

NB: PLC sessions should be conducted from the second week of the term through to revision week.

Who are the Key Actors in the PLC?

- District Education Oversight Committee (DEOC)
- MMD Director of Education
- MMD Head of Monitoring and Supervision,
- School Improvement Support Officer (SISO)
- Head of School
- Curriculum Lead
- JHS and SHS subject teachers

MMD Education Oversight Committee

- Validates the PLC programmes
- Develops guidelines for the effective implementation of all PLC programmes in the MMD
- Provides a supervisory role for the MMD Education Office in the performance of duties relating to PLC programmes and activities.

MMD Director of Education

- Approves the calendar for the integration of PLC activities into MMD plan
- Provides overall leadership and supervision of all PLC activities in the MMD and assigns targeted roles and responsibilities to subordinates.

MMD Supervision and Monitoring Officer

- Develops, in collaboration with DDE and School Improvement Support Officers

(SISOs), a plan for monitoring Fidelity of Implementation (FOI) initiative and the overall evaluation of the success of the PLC initiative.

- Reviews (with support from SISOs) monitoring, evaluation & fidelity of implementation data for each term and implement needed changes. In consultation with the DDE, select/recruit curriculum leads for the PLC for each school.

School Improvement Support Officer (SISO)

- Participates in the selection/recruitment of curriculum leads for the schools.
- Collects, collates, and submits to the MMDEO M&E and FOI data (nature of data and regularity of collection and reporting to be determined by GES in consultation with NaCCA).
- Identifies the training needs of the heads of schools and subject-teachers in partnership with the MMD Training Officer.
- Trains the heads of schools and curriculum leads and refers matters relating to attitudes and behaviours that are detrimental or advantageous to the intervention to the MMD Head of Monitoring and Supervision for moderation, share/promote the experiences of the various interventions among schools under his supervision.

Head of School

- Attends initial training on PLC programme
- Ensures the support of the School-based Management Committee (SMC), Parents-Teacher Association (PTA) and other stakeholders for the PLC programmes.
- Ensures the active participation of all teachers during PLC Sessions, as well as the implementation of innovative lesson-delivery strategies and best practices discussed at PLC meetings.
- Identifies and puts in place measures to acknowledge teachers who make an effort to implement best practices discussed at PLC meetings.
- Puts in place measures to monitor and report on learners' progress concerning performance indicators and established national performance standards.
- Adopts the FOI of learning for accountability.

JHS and SHS Subject Teachers

- Participate actively in all PLC Sessions (activities and programmes).
- Follow the revised CCP Curriculum, prepare scheme of learning and lesson plans/notes according to specification and keep track of challenges or difficulties encountered.
- Try out new teaching activities, strategies and practices discussed during PLC Sessions.
- Share challenges and successes with teaching colleagues in future PLC meetings.

How Do We Conduct an Effective PLC Session?

Pre-Discussion

- Register and introduce participants and key facilitators if any.
- Nominate a PLC secretary to take note of discussion points.
- Identify and discuss challenging themes, i.e. themes evolving from the CCP Curriculum training and implementation.
- Identify and invite an expert or colleague with in-depth knowledge of the theme identified to facilitate a PLC session or lead the discussions.
- Assign specific themes to different teachers (members of the PLC) to research and lead future PLC sessions.
- Encourage mutual discussions and contributions by all members.

Discussion stage (action)

- The lead facilitator takes participants through the content and demonstration lessons (where applicable) associated with the theme.
- Facilitation should be participatory, engaging and interactive.

Post-Discussion Stage

- At this stage participants evaluate the content and demonstration lesson learnt and assess the extent of improvement through reflection and debriefing.
- The agenda for the next meeting should be developed (or agreed upon) at the end of each meeting for participants and the PLC lead to prepare adequately for effective participation.
- Participants are expected to improve on their daily teaching skills through leading questions.
- Participants are encouraged to use group platforms strictly dedicated to PLC for professional learning and providing colleagues with useful professional materials.

Who Monitors the Activities of PLC?

- The Ghana Education Service (GES)
  - Headteacher
  - Circuit Supervisor
  - MMD Monitoring Officers
  - Regional Monitoring Officer
- National Inspectorate Board (NIB)
- National Teaching Council (NTC)
- National Council for Curriculum and Assessment (NaCCA)

http://www.allthingsplc.info/
http://www.sedl.org/pubs/change34/2.html
http://www.inspiringteachers.com

CONTINUOUS PROFESSIONAL DEVELOPMENT DAY (CPDD) FOR JHS BEGINNING 2020/21 ACADEMIC YEAR

Teachers in the Public JHS shall observe a Continuous Professional Development Day beginning 2020/21 Academic Year.

The observation of the CPDD shall help the teachers (facilitators) develop and/or adopt new strategies for teaching which will help them overcome identified challenges in their day to day activities as teachers (facilitators). Continuous Professional Development is in two folds:

1. **Professional Learning Communities (PLCs)**

   PLC, as explained earlier, is a group of educators and other stakeholders who meet regularly to share expert knowledge, skills and experiences for the improvement in the performance of learners, through effective lesson delivery and assessment. PLCs serve as an innovative mechanism for transforming the learning culture and social environment of the school. It connects and equips teachers from not only the same school, but from other schools within or outside the geographical location with information, learning and teaching strategies and best practices.

   About 50 minutes (one period of co-curricular activities) has been assigned to PLC activities every week on the school's timetable. It can be organised at the cluster or circuit level as well as subject-based. On PLC days, learners will close and go home while teachers meet at PLC sessions to learn and share ideas, concepts, skills, knowledge, and experiences to upgrade and improve themselves.

2. **Continuous Professional Development Days (CPDDs)**

   This will be organised once every quarter – 4 times a year. On these days, learners will be given a holiday to stay at home. Teachers will have a full training day to update their content knowledge, sharpen their lesson delivery and pedagogical skills, as well as share experiences and best practices – leadership for learning, conducive social environment, sustainable learning concepts, etc.

Appendix B: DESIGNING SCHOOL-BASED TIMETABLES

A **school timetable** is a table for regulating and coordinating activities of the learners, teacher and school. Timetables are cyclical. These activities recur every week or every fortnight (in cases of shift schools).

The timetable for the Common Core Programme (CCP) Curriculum to be rolled out in the 2020/21 academic year has the following characteristics.

1. Proposed Contact Hours (Time on Task)

Number of periods per day:	8 periods
Number of periods per week:	40 periods (8 periods × 5days)
Duration per period:	50 minutes

2. Length of School Day

Time on Task:	400 minutes (50 minutes x 8 periods)
Break Time	60 minutes (two breaks at 30 minutes each)
Extra-curricular activities	50 minutes per day
Total length of school day	510 minutes (8.5 hours)

3. Proposed options for Length of School Day

S/No	Lessons Start	Lessons Close	Extra-Curricula
1	7.00am	2.40pm	2.40pm – 3.30pm
2	7.30am	3.10pm	3.10pm – 4.00pm
3	8.00am	3.40pm	3.40pm – 4.30pm

4. Proposed Co-Curricular Activities

- Life and Psychosocial Skills:
  - *Sports and Games*
  - *Tourism, Arts and Culture Club*
  - *STEM Club*
  - *Creative Writers/Debaters Club*
  - *Human Rights Club*
  - *Friends of the Earth Club*
  - *NGO Activities: Talks and Sensitisation etc.*
- Research, Science, Agriculture (Gardening) and Community Project
- Entrepreneurship Development, Guidance and Counselling.
- Library, Sustainable Learning and Study Skills
- Professional Learning Community (PLC), CPD and School/Cluster-based INSET

5. Period Allocations for Subjects

Subject	**No. of Periods**
Mathematics	4
English	4
Ghanaian Languages	3
French/Arabic	3
Science	4
Computing	3
Social Studies	3
Religious and Moral Education	3
Career Technology	4
Creative Arts and Design	4
Physical Education	3
Worship and Library Studies	2
TOTAL	**40**

Timetable Template

	30m	1 50m	2 50m	**B1** 30m	3 50m	4 50m	5 50m	6 50m	**B2** 30m	7 50m	8 50m	Co-Curricular
M	**A S S E M B L Y & R E G**			**B R E A K**					**B R E A K**			
T												
W												
T												
F												

- **Things to consider when populating the Timetable**

  In populating the template to develop a school-based community friendly timetable, the officer should consider the following:

  - Local dynamics – average walking distance from home to school.
  - Socio-cultural and economic activities etc. within the community.
  - If possible, the periods for Mathematics and the languages should be completed before lunch.
  - Activity-based lessons such as Computing, Career Technology, and Creative Arts and Design can be organised after lunch.
  - PLC should be allocated one of the 5 slots for co-curricular activities.

For further inquiries contact
National Council for Curriculum and Assessment (NaCCA)
Tel. No. +233 302 909 071
Email: info@nacca.gov.gh
Website: www.nacca.org.gh

Appendix C: Assessment in the CCP Curriculum

The ultimate goal of Assessment is to improve Learner's learning

[This document was prepared by the Assessment Unit of NaCCA led by Antwi Aning]

Introduction: What is Assessment?

Assessment is the process of collecting information or evidence of learning and achievements and using it to improve teaching and learning. It is about getting to know our learners and the quality of their learning. It is an ongoing process for gathering evidence of learning and using it to enhance learners' learning.

Why assess learners in our classrooms?

Assessment is the bridge between teaching and learning and the central process in effective instruction.

Generally, we assess to find out:

- what learners know
- what learners can do, and how well they can do it
- improve learners' learning
- gather evidence of learning
- inform instruction
- yield information about areas of weakness and problems of teaching and learning
- show the strength and weaknesses of learners
- identify individual differences and achievement gaps among learners
- assist teachers in the process of remediation.
- determine whether expected outcomes have been met

The CCP curriculum will be assessed both formatively and summatively but the outcome of both assessments will be used to move learning forward.

Formative Assessment

Formative Assessment is a concept which covers various approaches for using assessment to improve learners' learning. Two of such approaches are assessment **for** learning and assessment **as** learning**.** Formative assessment deals with finding out on day-to-day basis, information about learners' progress and difficulties so that immediate measures can be taken.

Any instructional activity that allows teachers to uncover the way learners think about what is being taught and which can be used to promote improvements in learners' learning can serve a formative purpose. Formative Assessment supports learning during the learning process.

Characteristics of Effective Formative Assessment

- Clarifying, understanding, and sharing learning goals and criteria for success with learners.
- Creating effective classroom discussions, questions, activities, and tasks that offer the right type of evidence of how learners are progressing to the agreed learning goals.
- Providing feedback that moves learners forward.
- Activating learners as learning resources for one another.
- Activating learners as owners of their own learning.
- Using varied instructional methods to meet diverse learner's needs.
- Using varied approaches to assessing learner's understanding.

(Thompson & William, 2007)

Summative Assessment

It is an assessment which is generally taken by learners at the end of a unit, a term or semester, end of year or a course to demonstrate the "**sum**" of what they have or have not learned.

- Usually, it is called Assessment of Learning
- It compares learners' knowledge or skills against standards or benchmarks.
- It evaluates mastery of learning and offers information on what learners know and do not know.
- It provides educators with the metrics to know what's working and what's not.

- Usually, it is high stakes, for example when used for promotion, admission, certification, selection, accountability, etc.
- Can also be used formatively if it provides feedback to inform teaching and learning.
- Does not provide teachers with vital information to use in crafting remedial instruction.
- Plays a pivotal role in education by troubleshooting weaknesses in the system despite its shortcomings.
- Provides educators with valuable information to determine the effectiveness of instruction for a particular unit of study, to make high-stakes decisions and to evaluate the effectiveness of schoolwide interventions.
- Works to improve overall instruction.
    - by providing feedback on progress measured against benchmarks,
    - by helping teachers to improve, and
    - as an accountability instrument for continuous improvement of systems (Hart et al., 2015).

Formative Assessment Approaches

1. Assessment for learning (AfL)

Assessment for Learning (AfL) is an approach, integrated into teaching and learning, which creates feedback for learners to improve learning. i.e. occurs when assessment and learning are integrated.

AfL is not a means of evaluating schools, teachers or learners, rather it is a feedback mechanism.

It provides learners with rich, meaningful and timely feedback on their learning and progress throughout a programme of study. Assessment for Learning is an ongoing part of teaching & learning in which both teachers and learners share the responsibility for learning. It can take many forms, and may be either formal or informal (Yorke 2003). With AfL, teachers can understand better how their learners are learning and use this to plan what they will do next with a class or individual learners. AfL helps the learner to see what they are aiming for and understand what they need to do to achieve those aims. AfL therefore focuses on the teacher and the learners' understanding.

Why is AfL important?

Assessment for learning is a key pedagogical tool for:

- establishing where the learners are in their learning
- establishing where they are going
- working out how to get them there

(William, 2009)

2. Assessment as learning (AaL)

In this approach, learners are their own assessors. They monitor their own learning, ask questions and use a range of strategies to decide what they know and can do, and how to use assessment for new learning. AaL helps learners to take more responsibility for their own learning and monitoring future directions. Learners are able to learn about themselves as learners and become aware of how they learn. They reflect on their work on a regular basis, usually through self and peer assessment and decide what their next learning will be.

The teacher's role in assessment *as* learning is to:

- model and teach the skills of self-assessment
- guide learners in setting their own goals, and monitoring their progress towards them
- provide examples and models of good practice and quality work that reflect curriculum outcomes
- work with learners to develop clear criteria of good practice

Feedback in Assessment

Feedback is an important component of the formative assessment process. Formative assessment gives information to teachers and learners about how learners are doing relative to learning goals. Giving good feedback is one of the skills teachers need to master as part of good formative assessment. *(Ref: Susan M. Brookhart)*

For feedback to be effective for learners, they need the following:

- an understanding of the desired learning goal;
- evidence about their present position in relation to that goal;
- guidance on the way to close the gap between the two.

Effective feedback should:

- focus on what is being learned (learning outcomes) and how learners should go about it (success criteria)
- occur as the learners are doing the learning, i.e. be given at a time when the response will help the learner improve their learning
- provide information on how and why the learner has or has not met the criteria
- be phrased so the learner can understand how he/she should respond and;
- provide strategies or act as guidance showing how the learner can improve; and
- encourage a dialogue (where appropriate), so the learner can probe for clarification on next steps needed to progress their learning.

Success Criteria

It is important in the learning cycle that the learners and teacher are all aware of what will show that learning has taken place.

Why Are Success Criteria Important?

- Improve understanding
- Empower learners
- Encourage independent learning
- Enable accurate feedback
- Enhance quality assessment which is totally dependent on the use of success criteria

What Are Success Criteria?

'… success criteria summarise the key steps or ingredients the learner needs in order to fulfil the learning goal – the main things to do, include or focus on.' (Shirley Clarke)

Effective Success Criteria

- are **linked** to the learning intention;
- are specific to an activity;
- are measurable;
- are **discussed and agreed** with learners prior to undertaking the activity;
- provide a **scaffold** and focus for learners while engaged in the activity; and
- are used as the basis for **feedback** and peer-/self-assessment

Sample success criteria

B 2.1.2.3.1	Low	Medium	High
Describe a solid-solid mixture and explain how to separate the components	I can correctly identify and give an example of a solid- solid mixture	I can form and describe a solid-solid mixture	I can separate a solid-solid mixture into its components

Assessment for Learning Strategies

The following are samples of activities that you can try in your classroom. These can be adapted to be applied to all subjects and stages of education.

Shared Learning Goals

Promote learner's autonomy over their learning progression by sharing with them the learning goals, and most importantly the success criteria.

Learners write or ask questions

For example –

- About what they would like to know on a new topic;
- To ask the teacher or other learners in order to assess their learning;
- To demonstrate their learning/misconceptions/areas they would like to further explore.

Lesson Target Setting

- Make the lesson more purposeful for learners by setting targets at the beginning about what you and the class are going to do;
- These can be referred to through the lesson and/or revisited in the plenary;
- Learners could then show how they have met targets in the plenary and/or set targets for next lesson.

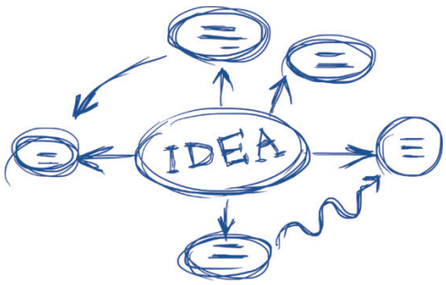
Making Learning Goals Clear

- Put lesson goals on the board at the beginning of the lesson;

- Talk to learners about why they are studying what they are studying;
- Contextualise short-term goals in long-term goals and make real life application clear (e.g. understanding the nature of things in the environment – living and non-living will contribute to our wider understanding of the world around us) and;
- Check with learners whether they understand the goals of the lesson.

Brainstorming

- Brainstorming is a technique used to determine what a learner may already know about a particular topic. Learners often feel free to participate because there is no criticism or judgment.
- Follow this with a clear description of what concepts to be covered in the lesson (to consolidate and clarify understandings)



Devising Questions

Devise questions that –

- Challenge common mistaken beliefs about a topic (misconceptions)
- Create conflict that requires discussion
- Explore ambiguity and encourage discussion and clarification

Wait time

- Wait time allows learners time to think and therefore to produce answers. Also, not everyone in the class thinks at the same speed or in the same way – waiting allows learners to build their thoughts and explore what has been asked.
- 2 types of wait time –
  - Teacher speaks and then waits before taking learners' responses.
  - Learner response ends and then teacher waits before responding. This gives the learner space to elaborate or continue – or for another learner to respond.

Observations

Teacher observations can be made in the course of delivery, during times of questioning and feedback and when learners are engaged in activities, either alone or with peers or groups. Look out for the look of confusion, nod or spark of understanding etc. We observe to be responsive and adjust to keep the learning going or notice when it is time to stop or recap a concept.

Tell your neighbour

- Learners 'tell their neighbour' as a means of articulating their thoughts.
- Ask a question, give thinking time and then ask learners to tell their neighbour their thoughts.
- This can either prepare whole class for 'hands down' questioning (where teacher asks randomly selected learner to contribute) or can precede a whole class discussion.

Think–Pair–Share

Give learners the opportunity to articulate their thinking before answering:

- Allow 30 seconds – 1-minute silent thinking before any answers
- Ask learners to write some thoughts down before answering
- Ask learners to brainstorm in pairs first for 2-3 minutes
- Then, get learners ready to talk about their own ideas or their group's ideas in a whole class discussion

Think–Pair–Square

- Think-Pair-Square is the same as Think-Pair-Share except that learners share their answers with another pair instead of the whole class.

Debates

- Debates enable the teacher to informally evaluate learners' oral work by assessing their oral presentation skills in terms of their ability to understand concepts and present them to others in an orderly fashion.

Post-It /Slate/ Mini-whiteboard/ Rough-workbook

Use post-it notes (or the other materials above) to evaluate learning. Groups, pairs or individuals can answer:

- Did I meet the success criteria?
- What should be done to improve next time?

Or:

- What have I learnt?
- What have I found easy?
- What have I found difficult?
- What do I want to know now?

K – W – L

- At the beginning of a topic let learners create a grid with three columns –

What They Know	What They Want To Know	What They Have Learnt

- They begin by brainstorming and filling in the first two columns and then return to the third at the end of the unit (or refer throughout).
- Variation – extra column 'How Will I Learn?'

Response Partners

- Paired or partnership oral marking. Learners invite a partner or a group to discuss or comment on their work. For it to be effective, learners should be aware of the learning goals and success criteria. They should also appreciate the role of a response partner – to offer positive and constructive feedback around the learning goals.
- Learners could be given prompt questions to ask the person who has done the work.

Exemplar Work

- When setting learners a piece of work, show them examples that make it clear what it is they are being asked to do – and what they need to do in order to meet the assessment criteria.
- Learners could mark exemplar work using the assessment criteria. This will help model what is being asked for and how it relates to the process of assessment.

2 Stars and a Wish

For peer assessment, ask learners to give two stars and a wish.

- Two stars = 2 things that are good about the piece of work.
- A wish = something they can improve to make it even better.

Traffic Lights

Use traffic lights as a visual means of showing understanding. Coloured card or paper could be used.

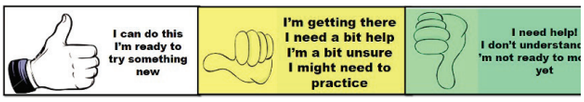
- Variation – Using smiley faces

  Where coloured card is unavailable, simple face emojis can be used to communicate learners' understanding.

  ☺😐☹

Hand Signals

- Hand signals range from learners raising their hands to respond to a question posed by the teacher to a group to "thumbs up/down" signal to determine learners "acknowledged" understanding of a concept or process.



When using traffic lights or hand signal techniques, it is important to ask a few follow up questions to check learners' actual level of understanding. Learners who are confident can also be used to support or explain to others who are not as confident yet.

Show and Tell

- During teaching, you can use mini-whiteboards/slates/rough-work book so that every learner can write or draw their answer and show it to you (or their peers) immediately. Follow up with questioning to check for genuine understanding or to build upon answers especially in subjects like [insert subject] where there is often one answer.

Active Learners

Key to AfL is learners being active, engaged participants in their learning. Think of ways in which content can be manipulated for these ends, rather than the other way round. If the content seems boring make the approach fun or interesting.

Learners write Questions

For example –

- About what they would like to know on a new topic
- To ask the teacher or other learners in order to assess their learning
- To demonstrate their learning/misconceptions/areas they would like to further explore

The classroom could have a question box where learners drop questions at the end of a lesson.

Or, a plenary could involve learners writing questions that the class then work on together, or forms the basis of the next lesson.

Learners ask Questions

Create opportunities for learners to ask questions. This could be of their peers, of the teacher or as a means to develop discussion.

A 'question box' for written questions offers a different means of communication for learners

Allow time for learners to ask questions about pieces of work. This helps open up assessment and eliminate ambiguity

Comment-only Marking

Comment-only marking provides learners with a focus for progression instead of a reward or punishment for their ego (as a grade does).

Comments could be made in books, in a table at the front of their books, in a learning diary or journal. The latter are helpful for teacher and learner to track the progression of comments and see improvement.

Comments should make it clear how the learner can improve.

Plan activities and work with feedback in mind – let the design assist the process.

Mid-unit Assessment

Having an assessment at the end of a unit may not provide time for you to go over areas learners have struggled with, or in which there are general misconceptions.

Timing assessment during a unit allows time to review, reflect and revisit. It also gives the teacher an opportunity to focus explicitly on areas of weak understanding supported by evidence.

Might

When questioning, insert the word 'might' to give learners greater opportunity to think and explore possible answers.

e.g.

What is meaning of democracy?

What might the meaning of democracy be?

The first infers a single answer known by the teacher whereas the second is inherently more open.

What might the Great Depression look like today?

Wait time

Wait time allows learners time to think and therefore to produce answers. Also, not everyone in the class thinks at the same speed or in the same way – waiting allows learners to build their thoughts and explore what has been asked.

2 types of wait time –

i) Teacher speaks and then waits before taking learners' responses.

ii) Learner's response ends and then teacher waits before responding. This gives the learner space to elaborate or continue – or for another
learner to respond.

Open vs closed

Closed questions can be useful however they are not great at facilitating the use of abstract thinking skills, encouraging talking or eliciting much understanding. Open questions are more likely to do this and thus improve learning. E.g.

Did you go out last night? - (How can you make this question open?)

What did you do after school yesterday?

Exemplar Work

When setting learners a piece of work, show them examples that make it clear what it is they are being asked to do – and what they need to do in order to meet the assessment criteria.

Learners could mark exemplar work using the assessment criteria. This will help model what is being asked for and how it relates to the process of assessment.

Learner Marking

By taking part in the process of assessment, learners gain a deeper understanding of topics, the process of assessment and what they are doing in their own work. This helps to make them more aware of 'what learning is' and thus see their own learning in this way.

Learners could self- or peer- mark homework or assessments.

This could be done in pairs or individually with a learner-made or 'official' mark-scheme.

Lesson Target Setting

Make the lesson more purposeful for learners by setting targets at the beginning about what you and the class are going to do.

These can be referred to through the lesson and/or revisited in the plenary.

Learners could show how they have met targets in the plenary and/or set targets for next lesson.

2 Stars and a Wish

For peer assessment, ask learners to give two stars and a wish.
Two stars = 2 things that are good about the piece of work
A wish = something they can improve to make it even better

Articulate then Answer

Give learners the opportunity to articulate their thinking before answering –

- 30 seconds silent thinking before any answers
- Brainstorm in pairs first for 2-3 minutes
- Write some thoughts down before answering
- Discuss with your neighbour first

Tell your Neighbour

Learners 'tell their neighbour' as a means of articulating their thoughts.

- Ask a question, give learners time to think and then ask learners to tell their neighbour their thoughts.
- Tell learners what the new topic is and ask them to tell their neighbour everything they know about it.

Idea Thoughts

When you have received an answer to a question, open up the thinking behind it by asking what others think about the idea. E.g. "What do others think about _____'s idea?"

Devising Questions

Devise questions that –

- Challenge common misconceptions
- Create effective classroom activities, questions and tasks that prompt the right type of discussions
- Explore ambiguity and encourage discussion and clarification

Learning Journal

Create a learning journal in which learners can reflect and review their learning. It could include plenary activities, a target setting chart, aims and goals, etc.

Group Feedback

Group feedback to a teacher concerning peer-assessment of work can help make the teacher aware of learning needs in a manageable way.

If a group feeds back then it draws more attention and presents information that has already been ordered and sorted (meaning less repetition for the teacher).

Peer Marking

Learners mark each other's' work according to assessment criteria.

Encourages reflection and thought about the learning as well as allowing learners to see model work and reason past misconceptions.

Opportunities to do this throughout individual lessons and schemes of work.

Teach Collaboration

Peer assessment requires learners to act collaboratively. Indeed, AfL is a collaborative enterprise therefore, explicitly teach skills of collaboration.

This process can be assisted by discussing collaboration with learners and making it visible as a part of the classroom.

Traffic-Light Revision

When revising a topic or subject, work through the different areas with learners and ask them to traffic light according to their grasp of each.

Subsequently, learners should be able to target their revision more carefully and engage in it actively, rather than simply reviewing everything they have done or reading passively over their entire notes.

Group Answers

Learners work in small groups to agree on answers – when tests are returned or in other situations.

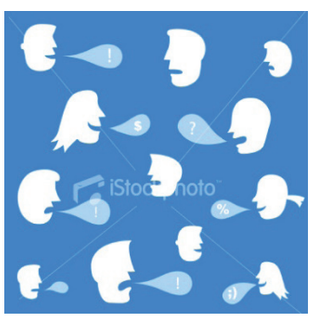
The process of agreeing should include reasoning over the validity of the consensus answer, as well as reasoned negation of misconceptions or wrong answers.

Think-through Talking

Talking allows learners to articulate their thoughts and thus to learn.

Encourage thinking through talking with –

- Discussion activities
- Structured group/pair work
- Modelling by teacher and learners (small group work increases the 'surface area' of talk in the classroom as opposed to whole class discussions)



Communication

Ask learners to communicate thinking through different mediums – not just writing; drawing, drama, maps, sculpture etc.

The medium is the message and therefore circumscribes to some extent how communication can take place. Using alternative mediums allows the teacher to 'see' learners' understanding from different angles.

Appendix D: ABRIDGED GUIDELINES FOR THE FORMATION AND MANAGEMENT OF SCHOOL-BASED CLUBS AND SOCIETIES (SCS) FOR THE IMPLEMENTATION OF THE STANDARDS-BASED AND CCP CURRICULA

Introduction

These guidelines provide tips and ideas for teachers and learners on how to establish and manage **SCSs** at the pre-tertiary level of education in Ghana. They also suggest simple activities that the clubs can carry out. However, this is only a start since the real success of the club in your school will depend on the efforts of the leadership of the clubs being creative, thinking outside the box and coming up with innovative ideas, concepts, projects and activities. The innovations are expected to motivate and elicit in members, the desire go the extra mile while having fun as they learn.

What are School-based Clubs and Societies?

School-based clubs or societies are organised groups approved by the school authorities to offer learners the opportunity to participate in activities they enjoy, learn new skills, explore their talents, meet new colleagues, share experiences and engage in healthy competitions. Learners showcase their talents and acquire functional and lifelong skills. Through SCS activities, learners experience the life that exists outside the classroom and school walls. Majority of learners enjoy club activities because they get the occasion to spend time with their friends and engage in activities they consider as fun and interesting**.** School administrators and teachers also like to see learners participate in co-curricular activities as it helps them know the learners better. The learners demonstrate sterling qualities and skills such as leadership, communicative, organisational, critical thinking, problem solving, creative, innovative, collaborative etc. Every School-based club must have a teacher to supervise the club's activities and report to the school head. Learners are to be given leadership positions such as president, vice-president, secretary and organiser.

Why School-based Clubs and Societies?

The **SCS** seeks to:

- Equip the learner with foundational, functional and lifelong skills.
- Strengthen the acquisition and application of the of the 4Rs and core competencies:
  - critical thinking and problem solving skills;
  - creative and innovative skills;
  - collaborative and communication skills;
  - global citizenship;
  - entrepreneurial skills.
- Introduce the learner to research and project-based learning, enhanced community networking and linking of schools and learners.
- Equip learners with the spirit of volunteerism and community service.

What are the suggested SCS for our Schools?

- Community Service Club
- Digital Literacy Club
- Friends of the Earth Club
- Human Rights Club
- Literary Club (Debaters, Creative Writers and Drama)
- Sports and Games
- STEAM (STEM) Club (Currently, there is what is called STEAM Club. It aims to spark the excitement of young people for Science, Technology, Engineering, Art, Mathematics and More. The challenge is that learners focus more on the Sciences and forget about the interrelatedness between Science and the Arts)
- Tourism, Arts and Culture Club

Other clubs approved by the Ghana Education Service (GES)

How Do We Establish SCS?

1) ***Planning, Consultation and Stakeholder Engagement:***

- Community engagement is key to the success of your club – this should be kept in mind as well for any community project.
- Talk to staff members, identify interests, hobbies, talents, and skills of learners, and decide with colleagues which club ideas learners will be comfortable participating in.
- Align the interest of colleagues to the interests, hobbies, talents, and skills you have all identified. Get them to commit to helping the club to develop.
- Arrange with the head of school and administration for permission to start a club or identified clubs.
- Talk to parents and other stakeholders (chief, assembly member, etc.) and seek their support.
- Speak to other volunteers in the school and community to get like-minded colleagues to help run the club with you.

2) ***Choosing Club Members***

- Choosing club members should mainly be based on the interests, hobbies, talents, and skills of the learner.
- Decide on a class, form or grade level as target group with a focus on inclusion.
- Decide on gender mix; are you targeting more boys or more girls? Why?
- Targeting a particular class or grade level allows for effective monitoring and evaluation.
- It is always helpful to have learners from different classes and programmes represented, so they can learn from one another, and provide feedback about what they learn to their other mates.
- Get enough people interested - at least 1 teacher and at least ten (10) learners.
- Guide club members to elect club officials - president, secretary, organiser, financial secretary, ladies' rep etc.
- Paste names of elected officials on notice board.
- Inform them of their roles and responsibilities through an orientation.

3) ***Branding the Club:***

- Get a name for the Club.
- Brainstorm on club's mission - What do you want to accomplish and how it can be done?
- Draw up action plan – what activities and projects will you carry out to accomplish the club's objectives?
- Make paraphernalia, souvenirs and create a Social Media presence on Facebook, Twitter, or a club web blog where you can host an online club magazine. These make learners feel special and have a sense of belonging.

4) ***Invitation to Club Members***

- Get parents, CSOs, NGOs, other schools and school heads involved.
- Explain to parents and learners what the club stands for and the benefits it will offer the learner.
- Together with some learners who have bought into the idea of the club, design a membership form.
- Publicise club activities - announce upcoming events and updates of club activities on notice boards, during assemblies and through social media, etc.
- Invite 'specially targeted' learners to the club.
- Keep records of the club's activities – minutes, attendance, projects, etc.

5) ***Launch the Club***

- Launch the Club and explain to the members the focus of the club.

- Make the club activities fun and engaging, and perhaps offer some incentives as long as these can be sustained.
- Ensure that the club activities do not become an extension of classroom learning activities.

6) ***Keeping it Simple***

- Don't feel any pressure to run complicated activities.
- Simple projects work well for new clubs.
- Meet an hour once every week as captured on the school's timetable.
- Use the club's activities to discuss effective ways of doing things - 'Dos' and 'Don'ts'
- Regularly review your projects and revise your action plan accordingly.

***NB**: Sample club activities can be downloaded from the internet.*

7) ***Selecting Club Patrons***

- Club Patrons are volunteers who voluntarily offer their human and material resources to support the activities of the club.
- Consult and select patrons who are willing to support the activities of the club.
- Patrons should be persons whose interests, skills, and hobbies align with the aims, objectives and goals of the club.

8) ***Celebrating Achievements***

- Celebrate members for actively participating in the activities and programmes of the club.
- Provide certificates and other souvenirs to members who dedicate themselves.
- These awards could be done during school assemblies and other social gatherings to help raise the profile of the club across the school and also to motivate other learners.
- A journal/diary should be designed to help learners reflect on what they do during club activities.

Community Service

Learners get motivated to practise what they learn at school when they are given the opportunity to undertake community service. They become agents of change in their communities and learn to be proactive citizens. During community service learners are guided to identify common challenges and the relationship between community resources and opportunities to an improved way of life. Some activities they can do are:

- Community projects on climate change, tree planting, clean-up exercises etc.
- Community sensitisation and awareness on emerging issues.

Excursions and Field Trips

Excursions and field trips help learners to gain more insight into socio-cultural and economic issues and offer them an opportunity to have a first-hand experience of what they only hear or read about. They learn about current situations and get informed about how they can improve their performance in other learning areas. Learners can visit:

- Historical and heritage sites;
- Industries and production units;
- Government institutions and departments;
- Botanical gardens or wildlife parks; and
- Power plants using alternative energy sources such as solar, wind, geothermal, etc.

Projects

- Robotics
- Creative Arts productions: art and craft works, theatre and musical concerts etc. to sensitise, educate and entertain
- Tree planting
- Renewable energy projects
- Essay competitions
- Climate change
- Research and surveys

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Appendix E: FIDELITY OF IMPLEMENTATION OF THE COMMON CORE PROGRAMME (CCP)

KEYS (✓ TICK AS APPLIES): **YES**: Indicates indicator has been attained

NO: Indicates that indicator has not been attained

N**OT YET:** Indicates that the indicator is yet to be initiated

NEEDS SUPPORT: Indicates indicator where a teacher needs assistance from a SISO, Head teacher, a colleague, a resource person, Curriculum lead or any DEO. A teacher can tick any of the above three and this section. Write specific area the teacher needs support in the Remarks Column. ***NB: Not applicable to all indicators***

A. TEACHERS CHECKLIST

S/N	INDICATORS	YES	NO	NOT YET	NEEDS SUPPORT	REMARKS
1.	Prepares and submits lesson notes on time					
2.	Applies differentiation and scaffolding in lesson delivery					
3.	Understands Assessment for Learning, Assessment as Learning and Assessment of Learning strategies					
4.	Frequently uses Assessment for Learning, Assessment as Learning and Assessment of Learning strategies in lessons					
5.	Gives immediate feedback to learners after assessment					
6.	Has teacher learner resource packs available for lesson planning and delivery					
7.	Understands issues of barriers to learning and takes measures to assist learners overcome them					
8.	Partakes in PLC meetings					
9.	Partakes in school clubs and societies					
10.	Assists learners as individuals with differentiated abilities, needs, achievement and learning styles					
11.	Shares learning goals and success criteria with learners before lessons					
12.	Maintains consistent and proactive discipline					
13.	Anticipates classroom challenges					
14.	Remediates where learners have learning difficulties					
15.	Assists learners to reflect and take responsibility of their own learning					
16.	Assists learners set their own goals					
17.	Works with learners to develop clear criteria of good practice					
18.	Supports school administration with assigned tasks and responsibilities effectively					

B. HEADTEACHER

S/N	INDICATORS	YES	NO	NOT YET	NEEDS SUPPORT	REMARKS
1.	Understands the Core Competencies, 4Rs, Knowledge, Skills, Values and Attitudes					
2.	Specific remedial programmes are put in place to help learners with learning needs					
3.	Conducts classroom observation (*Select One*) A. Once a week B. Twice a week C. More than once a week C. Once every two weeks D. Once a month					
4.	Provides feedback on classroom observation for teachers to improve teaching and learning					
5.	Supervises records keeping on PLC meetings					
6.	Takes part in INSETS and PLC sessions in the school this term					
7.	Has Curriculum Lead (CL) in the school					
8.	Takes measures to overcome barriers of learning in the school					
9.	Has functional clubs and societies in the school					
10.	Monitors activities of clubs and societies in the school					
11.	Teacher and Learner Resource Packs and other resources for each subject available					
12.	Teaches alongside administrative duties					
13.	Supports teachers to access additional resources for implementation of the CCP					
14.	Involves the community in the implementation of the CCP					
15.	The community provides support to the school in implementing the SBC					
16.	SISO supports the school in the implementation of the CCP					
17.	Aside the SISO, other District Education Officers come to this school to monitor facilities, teaching quality, or teacher attendance					

C. CURRICULUM LEAD

S/N	INDICATORS	YES	NO	NOT YET	NEEDS SUPPORT	REMARKS
1	Organises PLC meetings in the school *(Select One)* A. Once a week B. Twice a week C. More than once a week C. Once every two weeks D. Once a month					
2	Keeps record of PLC meetings					
3	Partakes in INSET meetings in the school					
4	Develops and initiates capacity building programmes to support efficient implementation of the CCP					
5	Involves resources person to address challenges during PLC meetings					
6	Has resources to assist during PLCs meetings					

Appendix F: COMMON CORE PROGRAMME (CCP) CONCEPT

Introduction

In the first four years of high school education, learners are expected to take a Common Core Programme (CCP) that emphasises a set of high, internationally-benchmarked career and tertiary education readiness standards. Learners need to acquire these for post-secondary education, the workplace or both. The standards articulate what learners are expected to know, understand and be able to do by focusing on their social, emotional, cognitive and physical development. The CCP runs from Basic 7 through Basic 10.

The common core attributes of the learner, which describe the essential out- comes in the three domains of learning (i.e. cognitive, psychomotor and affective), are at the centre of the CCP (see Figure 1). Inspired by the values which are important to the Ghanaian society, the CCP provides an education of the heart, mind and hands in relation to the learner's lifetime values, well-being, physical development, metacognition and problem-solving abilities. Ultimately, this will produce character-minded learners who can play active roles in dealing with the increasing challenges facing Ghana and the global society.

The features that shape the common core programme are shown in Figure1. These are:

- learning and teaching approaches – the core competencies, 4Rs and pedagogical approaches;
- learning context – engagement, service and project;
- learning areas – mathematics, science, computing, languages (English, Ghanaian Languages, French and Arabic), career technology, social studies, physical and health education, creative arts and design and religious and moral education.

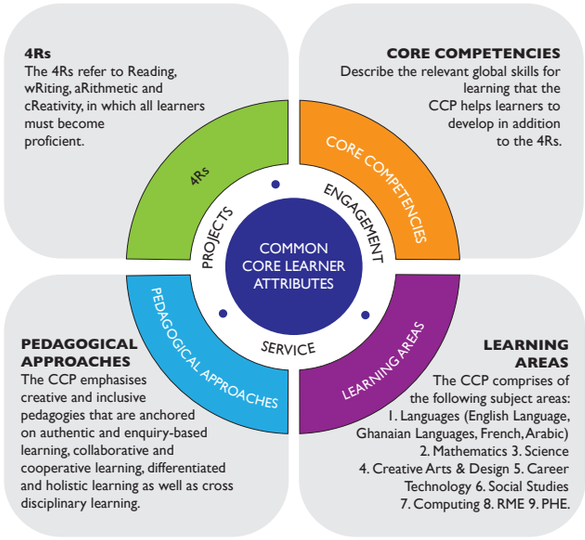

Figure 1: CCP Learner Attribute

These are elaborated subsequently:

Learning and teaching approaches

- **The core competencies***:* Describe the relevant *global skills for learning* that the CCP helps learners to develop in addition to the 4Rs. The global skills for learning allow learners to become critical thinkers, problem-solvers, creators, innovators, good communicators, collaborators, digitally literate, and culturally and globally sensitive citizens who are life-long learners with a keen interest in their personal development.
- **Pedagogical approaches:** The CCP emphasises creative and inclusive pedagogies that are anchored on authentic and enquiry-based learning, collaborative and cooperative learning, differentiated learning and holistic learning as well as cross disciplinary learning.
- **The 4Rs across the Curriculum:** The 4Rs refer to Reading, wRiting, aRithmetic and cReativity, which all learners must become fluent in.

Learning context

The CCP places emphasis on engagement of learners in the classroom activities and projects (in and outside classroom).These projects can involve individual or group tasks which all learners are required to complete by the end of Basic 10. The CCP project provides learners with contexts to demonstrate creativity and inventiveness in various areas of human endeavour. Community service offers an opportunity for learners to nurture, love and care for, and solve problems in their community.

Learning Areas

The CCP comprises the following learning areas:

1. Languages (English Language, Ghanaian Languages, French, Arabic)
2. Mathematics
3. Science
4. Creative Arts and Design (CAD)
5. Career Technology
6. Social Studies
7. Computing
8. Religious and Moral Education (RME)
9. Physical and Health Education (PHE)

This document sets out the standards for learning Science in the Common Core Programme (CCP). The standards in the document are posited in the expectation that the CCP (B7 – B10) will offer quality education for all types of learners. The design of this curriculum is based on the features of the CCP as shown in Figure 1. It emphasises a set of high internationally-benchmarked career and tertiary education readiness standards. Learners need to acquire these competencies in Science for post-secondary education, work- place training or both. The curriculum has been designed to be user friendly because it provides a detailed preamble that covers the rationale, philosophy, aims, profile of expected learning behaviours (i.e. knowledge, skills, attitudes and values), pedagogical approaches, core competencies and the 4Rs, assessment practices and instructional expectations.

Appendix G: LEARNING SCENARIOS

Case Study 1

Consider these two lesson scenarios and then discuss and answer the questions below:

Scenario 1

When the teacher enters her B3 class, some of the learners are shouting at each other; some are talking quietly; some are moving around restlessly; and others are quietly waiting for the lesson to begin. She claps her hands and the learners take out their books. The teacher asks the learners what they read yesterday. When they tell her, she asks them to go to the next story, 'The Hare and the Hyena'.

One of the learners, who has been chosen to always be the reader in this class, stands up and begins to read this story. While the boy is reading, some learners are still trying to find their book, and others are still talking; many of them do not have a book to follow. Only a few learners are paying attention to the text and listening to the boy read. While this is happening, the teacher completes the attendance register and occasionally looks up and shouts "Hey, look at your books and follow. I am going to ask some questions. All of those who do not answer the questions correctly will have extra homework."

When the text has been read aloud by the reader, the teacher asks a few questions about the text. Those who are listening and know the answers raise their hands and the teacher calls on them to give the answers. The teacher tells the learners to read the text again at home for homework, then the lesson ends.

Scenario 2

When the teacher enters her B3 class she spends a few minutes talking to the class, encouraging them to relax, interact, smile and laugh. The learners see she is carrying a book, 'The Hare and the Hyena' and the teacher holds the book up so all the learners can see it. Then the teacher introduces the book by asking questions about it to gain their interest. She asks questions at different levels for example:

'What colours are on the cover of this book?'
'What is on the cover of this book?'

'Who do you think are the main characters in this book?' 'What is the name of the book?'

'Who is the author?' What do you think the book is about?

She waits a moment after each question to give an opportunity for all the learners to raise their hands before choosing one to give the answer. Sometimes she asks a learner who hasn't raised their hand, if she thinks they will know the answer but are being lazy. The teacher goes on to ask other members of the class to explain what an author does, and then asks the learners to raise their hands if they know what a hare and a hyena are. She asks if any of the learners have seen these animals and what the animals did.

The teacher asks the learners what they think the hare and the hyena will do in the book. She then asks them to work in pairs to discuss what they think the story is about and how the story might begin and end. After a few minutes, the teacher asks one pair to give the results of their discussion. She asks if any other pairs think the same and they raise their hands. She then asks any of the remaining pairs for their thoughts. Finally, the teacher reads the first part of the story. As homework, she asks her learners to bring stories or information about the animals from their family, community members or elder peers for the next day. She tells them they will read and find out the end of the story tomorrow.

Discuss and answer:

1. Which of the two lessons do you think is most effective and why?
2. How does the teacher gain and maintain all learners' attention, participation and engagement?
3. What does the teacher do to accommodate all ability levels?
4. How does each teacher assess learning?
5. Can you find any missed opportunities in scenario 2 where the teacher could have used assessment for learning techniques?
6. How does the teacher use existing material and human resources in an interesting way?

Case Study 2

Consider these two lesson scenarios and then discuss and answer the questions below:

Scenario 1

The science teacher enters the B5 class and shouts for everyone to sit down and listen. She waits while some of the learners take out their books. The teacher tells the class they will learn about the respiratory system in humans. She asks the class to look at the relevant page in the textbook, and then asks one of the learners to read aloud while the others follow.

While the text is being read aloud, the teacher marks the exercise books from another class. Although few learners in the class pay any attention to the reading, when it is complete the teacher asks them to re-read the text aloud together. She then tells them to copy the diagram of the human respiratory system into their exercise books.

The teacher then continues marking as before until the end of the lesson when she asks for a show of hands of the learners that have completed the diagram. Five learners raise their hands and the teacher says 'good' and tells the others to complete it for homework

Scenario 2

The teacher starts her B5 science class by asking the learners what happened in the last lesson and how they got on with their homework. She is relaxed and friendly and encourages them to engage and interact. She explains that they are going to be thinking about how humans breathe and why and asks what they already know.

She then asks the learners to stand up and explains that when she says 'go!' they are to jump on the spot for a minute. On completion of the minute jumping the class discuss in pairs any changes they notice in their breathing pattern. The teacher then asks pairs to describe the changes they noticed; why do they think this happened? What do they think would happen if they jumped for a longer/shorter time? What would happen if they did a different type of exercise? What would happen if they sat down? Lay down? What happens when we sleep?

The teacher then asks the learners if they know which part of the body is used for breathing and what it looks like. She shows a chart depicting the respiratory system and explains the function. The learners then work in groups to develop a working model using balloons.

For homework the class need to gather evidence of any diseases or problems with breathing among their family members or community.

Discuss and answer:

1. Which of the two lessons do you think is most effective and why?
2. How does the teacher gain and maintain all learners' attention, participation and engagement?
3. What does the teacher do to accommodate all ability levels?
4. How does each teacher assess learning?
5. Can you find any missed opportunities in scenario 2 where the teacher could have used assessment for learning techniques?
6. How does the teacher use existing material and human resources in an interesting way?

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