NATIONAL COUNCIL FOR
CURRICULUM & ASSESSMENT
(MINISTRY OF EDUCATION)

SCIENCE
COMMON CORE PROGRAMME (CCP)
CURRICULUM FOR B7/JHS1 - B9/JHS3

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MINISTRY OF EDUCATION
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Science Curriculum for B7/JHS1- B9/JHS3

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FOREWORD

The Ministry of Education, acting through the National Council for Curriculum and Assessment (NaCCA) has, in recent times, been working on curriculum and assessment reforms to improve the quality and relevance of learning experiences in pre-tertiary schools in Ghana. This curriculum, known as the Common Core Programme (CCP), is a sequel to the Kindergarten-Primary standards-based school curriculum, the implementation of which commenced with the 2019/2020 academic year. The CCP is carefully designed for learners in JHS 1 – JHS 3 as part of a holistic learning experience that prepares them for post-secondary education, the world of work or both. The curriculum focuses on building character and nurturing values, in addition to ensuring a seamless progression for all learners from JHS to SHS and creates clear pathways for academic and career-related programmes from JHS 1 – JHS 3

In the twenty-first century, memorisation of facts and figures is no longer a sufficient learner attribute. Therefore, the CCP focuses on the acquisition of the 4Rs (Reading, wRiting, aRithmetic and cReativity) and core competencies to afford learners the ability to apply knowledge innovatively to solve every- day problems. Personal projects, community projects and community service have been integrated into the CCP as part of a comprehensive assessment programme, including assessment of knowledge, skills, attitudes and values that mainly emphasise what learners can do. It is hoped that the content of this curriculum will promote better high school education that meets the varied learning needs of the young people in the country and addresses the shortfalls in the current school curriculum in relation to learning and assessment.

The Ministry of Education is committed to ensuring that our schools develop globally competitive high school graduates who have the requisite employable skills and workplace ethos. The CCP curriculum will, therefore, play an important role in this regard. The Ministry will support the effective implementation of the CCP to include capacity development of all teachers to ensure improved learning experiences and outcomes for our young people.

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

ACKNOWLEDGEMENTS

This Common Core Programme (CCP) curriculum was developed together with the National Pre-tertiary Learning Assessment Framework (NPLAF) and Teacher's and Learner's Resource Packs. All these documents were developed by the National Council for Curriculum and Assessment (NaCCA), under the oversight and strategic direction of the Ministry of Education (MoE) with support from some agencies of the MoE and other relevant stakeholders.

NaCCA, acting on behalf of the Ministry of Education (MoE), would like to express its sincere gratitude to all its partners who participated in the professional conversations and discussions during the course of the development of the CCP curriculum.

NaCCA also extends special commendations to the leadership of the Ghana Education Service (GES), National School Inspectorate Authority (NaSIA), National Teaching Council (NTC), Commission for Technical and Vocational Education and Training (Commission for TVET) and other agencies of the MoE.

Additionally, NaCCA acknowledges the contributions of staff from various Universities and Colleges of Education as well as teachers and learners within the Ghana Education Service.

Special thanks go to those who also contributed to shaping this curriculum content through the consultation process, including the national stakeholder engagement conducted in Accra in February, 2020.

CONTENTS

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 JHS 1 – JHS 3.

The common core attributes of the learner, which describe the essential outcomes 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, wellbeing, physical development, metacognition and problem-solvingabilities. 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 Figure 1. These are:

- learning and teaching approaches – the core competencies, pedagogical approaches and the 4Rs.
- learning context – engagement service and project
- learning areas – Mathematics, Science, Computing, languages (English Language, Ghanaian Language, French and Arabic), Career Technology, Social Studies, Physical and Health Education, Creative Arts and Design and Religious and Moral Education.

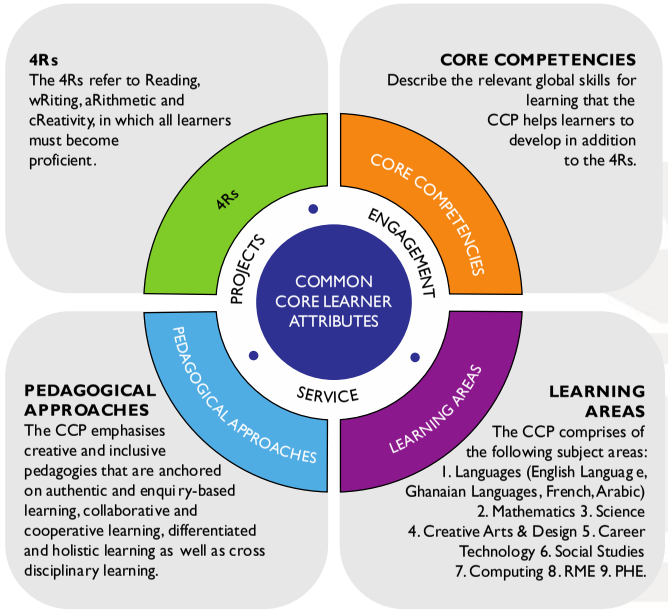

Figure 1 CCP Learner Attributes

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 JHS 1 – JHS 3

The CCP project provides learners with contexts to demonstrate creativity and inventiveness in various areas of human endeavour. Community service offers opportunity for learners to nurture, love, care for and solve problems in their community.

Learning Areas

The CCP comprises the following learning areas:

1. Languages (English, 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 JHS 1 – JHS 3 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, workplace 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.

RATIONALE

Science is a collaborative and creative human endeavour arising from our desire to understand the world around us and the wider universe. The study of a Common Core Science Programme from Basic Year 7 through Basic Year 9 (JHS1 – JHS 3) enables learners to build on what they have learnt from B1 to B6, and to further develop their knowledge of and about science.

We are surrounded by technology and the products of science every day. Government policy decisions that affect every aspect of our lives are based on scientific evidence. The immensely complex natural world that surrounds us illustrates infinite scientific concepts. As humans grow up in an increasingly technologically and scientifically advanced world, they need to be scientifically literate to understand issues and be able to live successfully.

Economic, political, social and physical development of a country is hinged on science, technology and innovation. 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 an enabling 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 the origin of things in our environment. The science curriculum has considered the desired outcomes of education for learners at the upper 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 practical and minds-on approaches, which learners will find as fun and consequently, adopt science as a culture.

PHILOSOPHY

Teaching Philosophy

Ghana believes that an effective education in science needed for sustainable development should be hinged on inquiry. 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 a learner-centred approach to teaching that engages learners physically and cognitively in the knowledge-acquisition process, in a rich and rigorous inquiry-driven environment.

Learning Philosophy

Science learning is an active contextualised process of constructing knowledge based on learners' experiences rather than acquiring it. Learners are information and knowledge constructors who operate as researchers. Teachers serve as facilitators by providing the enabling environment that promotes the construction of learners' own knowledge, based on their prior experiences. This makes learning more relevant and meaningful to the learner and leads to the development of critical thinkers, problem solvers and innovators.

GOAL AND AIMS

Goal

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

Specific Aims

The curriculum of the Common Core Science Programme for B7/JHS1 to B10 is designed for learners to achieve the following aims:

1. Develop the spirit of curiosity, creativity, innovation and critical thinking for investigating and understanding their environment.
2. Develop skills, habits of the mind and attitudes necessary for scientific inquiry.
3. Communicate scientific ideas effectively.
4. Use scientific concepts in explaining their own lives and the world around them.
5. Live a healthy and quality life.
6. Develop humane and responsible attitude towards the use of all resources in 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.

PROFILE OF EXPECTED LEARNING BEHAVIOURS

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

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

Knowledge, Understanding And Application

Under this domain, learners acquire knowledge through some learning experiences. They may also show understanding of concepts by comparing, summarising, re-writing, etc. in their own words and constructing meaning from instruction. The learner may also apply the knowledge acquired in some new contexts. At a higher level of learning behaviour, the learner may be required to analyse an issue or a problem. At a much higher level, the learner may be required to synthesise knowledge by integrating a number of ideas to formulate a plan, solve a problem, compose a story or a piece of music. Further, the learners may be required to evaluate, estimate and interpret a concept. At the last level, which is the highest, learners may be required to create, invent, compose, design and construct. These learning behaviours "knowing", "understanding", "applying", "analysing", "synthesising", "evaluating" and "creating" fall under the domain "Knowledge, Understanding and Application".

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

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

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

The explanation and the key words involved in the "Knowledge, Under- standing and Application" domain are as follows:

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

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

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

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

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

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

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

From the foregoing, creating is the highest form of thinking and learning and is therefore a very important behaviour. This unfortunately, is the area where most learners perform poorly. In order to get learners to develop critical thinking skills beginning right from the basic education level, it is advised that teachers do their best to help learners develop analytic skills as well.

Attitudes and Values

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

Attitudes

- Curiosity: The inclination or feeling toward seeking information about how things work in a variety of fields.
- Perseverance: The ability to pursue a problem until a satisfying solution is found.
- Flexibility in ideas: Willingness to change an opinion in the face of more plausible evidence.
- Respect for Evidence: Willingness to collect and use data in one's investigation, and also have respect for data collected by others.

- Reflection: The habit of critically reviewing ways in which an investigation has been carried out to see possible faults and other ways by which the investigation could be improved upon.

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

Values

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

- **Respect:** This includes respect for the nation of Ghana, its institutions and laws and the culture and respect among its citizens and friends of Ghana.
- **Diversity:** Ghana is a multicultural society in which every citizen enjoys fundamental rights and responsibilities. Learners must be taught to respect the views of all persons and to see national diversity as a powerful force for national development. The curriculum promotes social cohesion.
- **Equity:** The levels of socio-economic development across the country is uneven. Consequently, it is necessary to ensure an equitable distribution of resources based on the unique needs of learners and schools. Ghana's learners are from diverse backgrounds, and this therefore demands the provision of equal opportunities to all, and that, all strive to care for each other.
- **Commitment to achieving excellence**: Learners must be taught to appreciate the opportunities provided through the curriculum and persist in doing their best in whatever field of endeavour as global citizens. The curriculum encourages innovativeness through creative and critical thinking and the use of contemporary technology.
- **Teamwork/Collaboration:** Learners are encouraged to be committed to team-oriented working and learning environments. This also means that learners should have an attitude of tolerance to be able to live peacefully with all persons.
- **Truth and Integrity:** The curriculum aims to develop learners into individuals who will consistently tell the truth irrespective of the consequences, and be morally upright, with an attitude of doing the right thing even when no one is watching. They are to be true to themselves and be willing to live the values of honesty and compassion. Equally important, is the practice of positive values as part of the ethos or culture of the workplace, which includes integrity and perseverance. These underpin the learning processes to allow learners to apply skills and competencies in the world of work.

The action verbs provided in the learning domains in each content standard help to structure teaching in order to achieve the desired learning outcomes. The action verbs provided can be used for teaching, for evaluation exercises and for test construction. It is important to check the learning indicators to ensure that the required emphasis is given to each of the learning domains in teaching and assessment.

PROCESS SKILLS

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

- ☐ **Equipment handling:** This is the skill of knowing the functions and limitations of various apparatus, and developing the ability to select and handle them appropriately for various tasks.
- ☐ **Observing:** This is the skill of using the senses to gather information about objects or events. This also includes the use of instruments to extend the range of our senses.
- ☐ **Classifying:** This is the skill of grouping objects or events based on common characteristics.
- ☐ **Comparing:** This is the skill of identifying the similarities and differences between two or more objects, concepts or processes.
- ☐ **Communicating/Reporting:** This is the skill of transmitting, receiving and presenting information in concise, clear and accurate forms – verbal, written, pictorial, tabular or graphical.
- ☐ **Predicting:** This is the skill of assessing the likelihood of an outcome based on prior knowledge of how things usually turn out.
- ☐ **Analysing**: This is the skill of identifying the parts of objects, information or processes, and the patterns and relationships between these parts.
- ☐ **Generating possibilities:** This is the skill of exploring all the options, possibilities and alternatives beyond the obvious or preferred one.
- ☐ **Evaluating:** This is the skill of assessing the reasonableness, accuracy and quality of information, processes or ideas. This is also the skill of assessing the quality and feasibility of objects to inform decision-making.
- ☐ **Designing:** This is the skill of visualising and creating a mental or physical model of a process or event, or objects or gadgets.
- ☐ **Measuring:** This is the skill of using standard and non-standard instruments or devices to describe dimensions accurately.
- ☐ **Interpreting:** This is the skill of organising and evaluating data in terms of its worth: good, bad, reliable, unreliable; making inferences and pre-dictions from written or graphical data; extrapolating and deriving conclusions. Interpretation is also referred to as “Information Handling”.
- ☐ **Recording:** This is the skill of drawing or making graphical representation boldly and clearly, well labelled and pertinent to the issue at hand.
- ☐ **Generalising:** This is the skill of being able to use the conclusions arrived at in an experiment or observation of events to what could happen in similar situations.

- **Designing of Experiments:** This is the skill of developing hypotheses, planning and designing of experiments, persistence in the execution of experimental activities, modification of experimental activities where necessary in order to reach conclusions.

ASSESSMENT

Assessment is a process of collecting and evaluating information about learners and using the information to make decisions to improve their learning. Assessment may be formative, summative, diagnostic, or evaluative depending on its purpose. It is integral to the teaching-learning process, promotes student learning and improves instruction. In the CCP, it is suggested that assessment involves assessment for learning, assessment of learning and assessment as learning, which are described in the subsequent paragraphs.

Assessment for Learning (AfL)

Assessment for Learning (AfL) is the process of seeking and interpreting evidence of learning for use by learners and their teachers to decide where the learner is in their learning, where they need to be (the desired goal), and how best to get them there. AfL is one of the most suitable methods for improving learning and raising standards (Black & Wiliam, 1998). Assessment for Learning also refers to all the activities undertaken by teachers and/or by their learners, which provide information to be used as feedback to modify the teaching and learning activities in which they are engaged. AfL can be achieved through processes such as sharing criteria with learners, effective questioning, and feedback.

AfL, therefore, provides timely feedback to ensure individual learners are assisted during the teaching and learning process using various strategies and questioning to measure the learning that has actually taken place. It is a continuous process that happens at all stages of the instructional process to monitor the progress of a learner and to offer feedback or change teaching strategies to achieve the performance standards of a lesson.

Assessment as Learning (AaL)

Assessment as Learning develops and supports students' sense of ownership and efficacy about their learning through reflective practices. This form of self-assessment helps in building the competencies of learners to achieve deeper understanding of their own learning and what they are taught.

Assessment of Learning (AoL)

Assessment of learning provides a picture of the achieved standards of the teacher and performance of students at the terminal stage of the learning process. This information provides data for accountability and educational decisions such as grading, selection and placement, promotion and certification. Through AoL, stakeholders such as parents and guardians are informed about the extent students have attained expected learning outcomes at the end of their grade or programme.

WHAT DO WE ASSESS?

- ☐ Emphasis on assessment in the CCP is on the Common Core Learner Attributes, which are essential outcomes in the three domains of learning (i.e. cognitive, psychomotor and affective).
- ☐ Knowledge and Skills with Emphasis on the 4RS in the learning areas;
- ☐ Core competencies with emphasis on attitudes and values developed through the learning and its context as well as the pedagogical approaches.
- ☐ The process is illustrated diagrammatically in Figure 2.

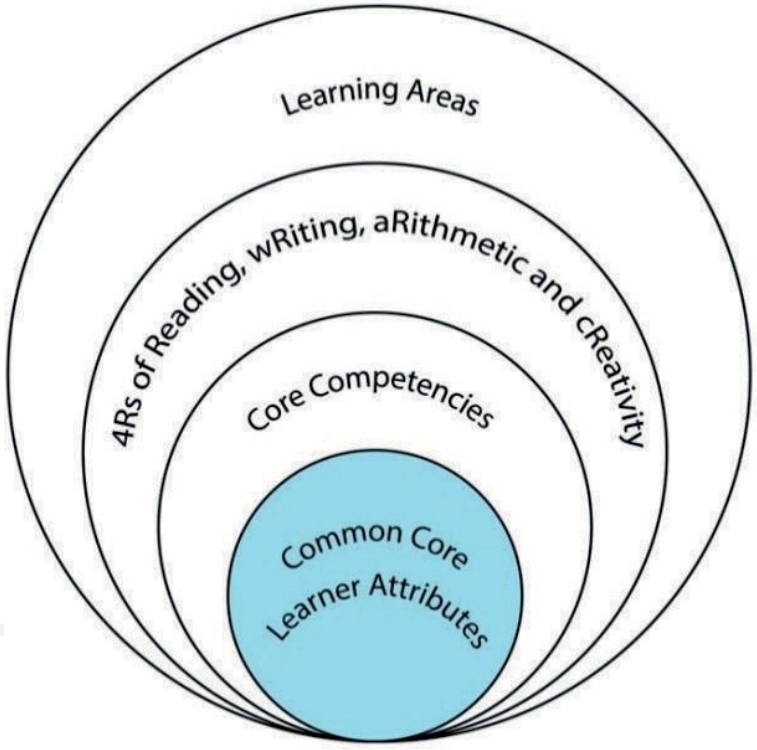

Figure 2: Essential Assessment Features

How do we Monitor Progress?

School-Based Assessment (SBA) covers all forms/modes of assessment including AfL, AaL and AoL (see Table 1), that can be undertaken by any school-level actor (learner, teacher, headteacher) to monitor the learner's achievement over a period of time. Data collection and keeping records of the data are central to

the conduct of SBA.

Table 1: Modes of Assessment

Assessment for Learning	Assessment of Learning	Assessment as Learning
Class exercises	Class Assessment Task	Portfolio
	(CAT)	
Quizzes	End of term assessment	Journal entries
Class tests (written, oral, aural and/or practical)	End of year assessment	Project work
Class Assessment Task (CAT)		Checklist
		Questionnaire

The following are samples of relevant records that can be kept on the student's learning:

- Student's Progress Record (Cumulative Record)
- Student's Report Card
- School-Based Assessment Termly Recording Register

Details of guidelines on SBA can be found in *the National Pre-tertiary LearningAssessment Framework (NPLAF)* document (Ministry of Education, 2020a) and *the School-Based Assessment Guidelines* (Ministry of Education, 2020b).

Reporting School-Based Assessment (SBA) In The CCP

The CCP uses a criterion-referenced model of presenting and reporting school-based assessment data. School-based assessment throughout the four-year duration of the CCP, is done against criteria linked to performance standards and not against the work of other learners. The CCP provides levels of proficiency to be attained and descriptors for all grade levels of the programme (see Table 2). These levels and descriptors cannot be changed by individual schools and are, therefore, common to all learners as well as learning areas nationwide. For each assessment criterion or (benchmark for the level of proficiency), a number

of descriptors are defined as shown in Table 2.

Table 2. Benchmarks, Levels of Proficiency and the Grade Level Descriptors

Level of Proficiency	Benchmark	Grade Level Descriptor
1: Highly proficient (HP)	80% +	Learner shows high level of proficiency in knowledge, skills and values and can transfer them automatically and flexibly through authenticperformance tasks.
2: Proficient (P)	68-79%	Learner demonstrates sufficient level of proficient knowledge, skills and core understanding; can transfer them independently through authentic performance tasks
3: Approaching Proficiency (AP)	54-67%	Learner is approaching proficiency in terms of knowledge, skills and valueswith little guidance and can transfer understandingthrough authentic performance tasks
4: Developing (D)	40-53%	Learner demonstrates developing level of knowledge, skills and values but needs helpthroughout the performance of authentic tasks
5: Emerging (E)	39% andbelow	Learner is emerging with minimal understanding in terms of knowledge, skills, and values but needs a lot of help.

The grading system presented, shows the letter grade system and equivalent grade boundaries. In assigning grades to pupils' test results, or any form of evaluation, the above grade boundaries and the descriptors may be applied. The descriptors (Highly Proficient [HP], Proficient [P], Approaching Proficiency [AP], Developing [D], Emerging [E]), indicate the meaning of each grade.

In addition to the school-based assessment (SBA), a national standards assessment test is conducted in Basic 8 to provide national-level indicators on learners' achievements

CREATIVE PEDAGOGICAL APPROACHES

The CCP emphasises creative and inclusive pedagogies that are anchored on authentic and enquiry-based learning, collaborative and cooperative learning, differentiated learning, holistic learning, cross disciplinary learning (i.e. the 4Rs across the curriculum) as well as developing the core competencies. This section lists some of the creative and inclusive pedagogies as follows for the CCP:

- Inclusive Pedagogical Approaches
- Learning-Centred Pedagogy
- Inclusion
- Differentiation
- Scaffolding
- Information Communications Technology
- Emphasis on Core Competencies

Learning-Centred Pedagogies

The learner is at the centre of learning. At the heart of the CCP curriculum is the learning progression and improvement of learning outcomes for Ghana's young people with a focus on the 4Rs – Reading, wRiting, aRithmetic and cReativity. It is expected that at each curriculum phase, learners would be offered the essential learning experiences to progress seamlessly to the next phase. Where there are indications that a learner is not sufficiently ready for the next phase, a compensatory provision through differentiation should be provided to ensure that such a learner is ready to progress with their cohort.

The curriculum encourages the creation of a learning-centred classroom with the opportunity for learners irrespective of sex, physical and emotional challenges to engage in meaningful "hands-on" activities that bring home to the learner what they are learning in school and what they know from outside of school. The learning-centred classroom is a place for the learners to discuss ideas through the inspiration of the teacher.

The learners then become actively engaged in looking for answers, working in groups to solve problems. They also research information, analyse and evaluate information. The aim of the learning-centred classroom is to enable learners to take ownership of their learning. It provides the opportunity for deep and profound learning to take place.

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

1. makes learners feel safe and accepted,
2. helps learners to interact with varied sources of information in a variety of ways,

3. helps learners to identify a problem suitable for investigation through project work,
4. connects the problem with the context of the learners' world so that it presents realistic opportunities for learning,
5. organises the subject matter around the problem, not the subject,
6. gives learners responsibility for defining their learning experience and planning to solve the problem,
7. encourages learners to collaborate in learning,
8. expects all learners to demonstrate the results of their learning through a product or performance.

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

Inclusion

Inclusion is ensuring access and learning for all learners, especially, those disadvantaged including the physically and emotionally challenged. Females and males to be actively involved in carrying out activities. All learners are entitled to a broad and balanced curriculum in every school in Ghana. The daily learning activities to which learners are exposed should ensure that the learners' right to equal access and accessibility to quality education is met. The curriculum suggests a variety of approaches that addresses learners' diversity and their special needs in the learning process. When these approaches are effectively used in lessons, they will contribute to the full development of the learning potential of every learner irrespective of sex. Learners have individual needs and learning experiences and different levels of motivation for learning. Planning, delivery and reflection on daily learning experiences should take these differences into consideration.

The curriculum therefore promotes:

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

Differentiation and Scaffolding

Differentiation is a process by which differences (learning styles, interest and readiness to learn) between learners are accommodated so that all learners in

a group have the best chance of learning. Differentiation could be by content, tasks, questions, outcome, groupings and support. Differentiation as a way of ensuring each learner benefits adequately from the delivery of the curriculum can be achieved in the classroom through (i) Task (ii) Sup- port from the Guidance and Counselling Unit and (iii) Learning outcome.

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

Differentiation by support involves the teacher giving needed support and referring weak learners to the Guidance and Counselling Unit for academic support.

Differentiation by outcome involves the teacher allowing learners to respond at different levels. Weaker learners are allowed more time for complicated tasks.

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

It involves breaking up the learning task, experience or concepts into smaller parts and then providing learners with the support they need to learn each part. The process may require a teacher assigning an excerpt of a longer text to learners to read and engaging them to discuss the excerpt to improve comprehension. The teacher goes ahead to guide them through the key words/vocabulary to ensure learners have developed a thorough under- standing of the text before engaging them to read the full text.

Common scaffolding strategies available to the teacher are:

1. give learners a simplified version of a lesson, assignment, or reading, and then gradually increase the complexity, difficulty, or sophistication over time.
2. describe or illustrate a concept, problem, or process in multiple ways to ensure understanding;
3. give learners an exemplar(s): or model of an assignment they will be asked to complete;
4. give learners a vocabulary lesson before they read a difficult text;
5. describe the purpose of a learning activity clearly and the learning goals they are expected to achieve; and
6. describe explicitly how the new lesson builds on the knowledge and skills learners were taught in a previous lesson

Information Communication Technology

Information Communication Technology (ICT) has been integrated into the Science curriculum as part of the core of education, alongside reading, writing and numeracy. Thus, the curriculum is designed to use ICT as a teaching and learning tool to enhance deep and independent learning. For instance, the teacher in

certain instances is directed to use multimedia to support the teaching and learning process.

ICT has the potential to innovate, accelerate, enrich, and deepen skills. It also motivates and engages learners to relate school experiences to work practices. It provides opportunities for learners to fit into the world of work.

Some of the expected outcomes that this curriculum aims to achieve are:

1. improved teaching and learning processes;
2. improved consistency and quality of teaching and learning;
3. increased opportunities for more learner-centred pedagogical approaches;
4. improved inclusive education practices.;
5. improved collaboration, creativity, higher order thinking skills; and
6. enhanced flexibility and differentiated approach of delivery.

The use of ICT as a teaching and learning tool is to provide learners access to large quantities of information online and offline. It also provides the framework for analysing data to investigate patterns and relationships in the computing context. Once learners have made their findings, ICT can help them organise, edit and print the information in many different ways. Learners, irrespective of sex, tribe, culture, physical and emotional challenge, need to be exposed to various ICT tools around them including calculators, radios, cameras, phones, television sets and computers and related software like Microsoft Office packages – Word, PowerPoint and Excel as teaching and learning tools. The exposure that learners are given from including the physically and emotionally challenged. Females and males to be actively involved in carrying out activities

to use ICT in exploiting learning will build their confidence and will increase their level of motivation to apply ICT use in later years, both within and outside of education. ICT use for teaching and learning is expected to enhance the quality and competence level of learners.

CORE COMPETENCIES

The core competencies describe a body of skills that teachers at the basic level should seek to develop in their learners. The competencies describe a connected body of core skills that are acquired throughout the processes of teaching and learning. They are the relevant global skills for learning that allow learners to develop, in addition to the 4Rs, to become critical thinkers, problem-solvers, creators, innovators, good communicators, collaborators, culturally identified individuals, digitally literate and global citizens who are have keen interest in their personal development. In using this curriculum, we hope the core competencies will be developed in learners to help them develop our country, Ghana. These competencies include:

Critical Thinking and Problem Solving (CP)

This skill develops learners' cognitive and reasoning abilities to enable them analyse and solve problems. The critical thinking and problem-solving skill enables learners to draw on their own experiences to analyse situations and choose the most appropriate among a number of possible solutions. It requires that learners embrace the problem at hand, analyse it, generate a number of possible solutions and decide on one and take responsibility to carry it out.

Creativity and Innovation (CI)

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

Communication and Collaboration (CC)

This competency promotes in learners, the skills to search for information and use appropriate languages, symbols, and texts to communicate and exchange information about their learning and life experiences. Learner actively participate in sharing their ideas. They engage in dialogue with others by listening to and learning from them. They also develop flexibility of mind to work together as a team, respect and value the views of others.

Cultural Identity and Global Citizenship (CG)

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

Personal Development and Leadership (PL)

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

Digital Literacy (DL)

Digital Literacy develops in learners, irrespective of sex and challenges, the ability to discover, acquire knowledge, and communicate through ICT to support their learning. It also makes them use digital media responsibly. For effective lesson planning in teaching, learning and assessment, it is suggested that teachers refer to Appendix A for details of the components of the core competencies. These details comprise the unpacked skills such as listening, presenting and teamwork for collaboration.

INSTRUCTIONAL EXPECTATIONS

The instructional expectations in the CCP Science Curriculumare as follows:

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

Suggested Time Allocation

A total of four periods a week, each period consisting of 50 minutes, is allocated to the teaching of science on the timetable .

ORGANISATION AND STRUCTURE OF THECURRICULUM

The curriculum has been structured into four columns which are strands, sub-strands, content standards, indicators and exemplars. A unique annotation is used for numbering the learning indicators in the curriculum for the purpose of easy referencing. The annotation is indicated in Table 2.

Table 2: Example: B7/JHS1.2.4.1.2

ANNOTATION	MEANING / REPRESENTATION
B7/JHS1	Year or Class
2	Strand Number
4	Sub-Strand Number
1	Content Standard Number
2	Indicator Number

Strands are the broad learning areas or domains of the science content to be studied.

Sub-strands are the sub-divisions of the broad learning areas or strands.

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 milestones 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 clearly explain the expected outcomes of indicators and serve as support and guidance to the facilitator/teacher in the delivery of the curriculum.

Table 3: Common Core Science Standards

LEVEL		B7/JHS1 (JHS1)		B8/JHS2 (JHS 2)		B9/JHS3(JHS 3)
STRAND		**SUB-STRANDS**		**SUB-STRANDS**		**SUB-STRANDS**
DIVERSITY OF MATTER	1.	Materials	1.	Materials	1.	Materials
	2.	Living cells	2.	Living cells	2.	Living cells
CYCLES	1.	Earth Science	1.	Earth Science	1.	Earth Science
	2.	Life Cycle of Organisms	2.	Life Cycle of Organisms	2.	Life Cycle ofOrganisms
	3.	Crop Production	3.	Crop Production	3.	Crop Production
	4.	Animal Production	4.	Animal Production	4.	Animal Production
SYSTEMS	1.	The Human Body Systems	1.	The Human BodySystems	1.	The Human BodySystems
	2.	The Solar System	2.	The Solar System	2.	The Solar System
	3.	Ecosystem	3.	Ecosystem	3.	Ecosystem
	4.	Farming Systems	4.	Farming Systems	4.	Farming Systems
FORCES AND ENERGY	1.	Energy	1.	Energy	1.	Energy
	2.	Electricity and Electronics	2.	Electricity andElectronics	2.	Electricity andElectronics
	3.	Conversion and Conservation of Energy	3.	Conversion and Conservation ofEnergy	3.	Conversion and Conservation ofEnergy

	4.	Force and motion	4.	Force and motion	4.	Force and motion
	5.	Agricultural Tools	5.	Agricultural Tools	5.	Agricultural Tools
HUMANS AND THE ENVIRONMENT	1.	Waste Management	1.	Waste Management	1.	Waste Management
	2.	Human Health	2.	Human Health	2.	Human Health
	3.	Science and Industry	3.	Science and Industry	3.	Science and Industry
	4.	Climate Change and Green Economy	4.	Climate Change andGreen Economy	4.	Climate Change andGreen Economy
	5.	Understanding the Environment	5.	Understanding the Environment	5.	Understanding theEnvironment
			6	Soil as a Component of the Environment	6.	Soil as a Componentof the Environment

SCIENCE SCOPE AND SEQUENCE

Table 4: Science Scope and Sequence

STRAND	SUB-STRANDS		B7/J HS1	B8/J HS2	B9/J HS3
DIVERSITY OF MATTER	1.	Materials	✓	✓	✓
	2.	Living Cells	✓	✓	✓
CYCLES	1.	Earth Science	✓	✓	✓
	2.	Life Cycle of Organisms	✓	✓	✓
	3.	Crop Production	✓	✓	✓
	4.	Animal Production	✓	✓	✓
SYSTEMS	1.	The Human Body Systems	✓	✓	✓
	2.	The Solar system	✓	✓	✓
	3.	Ecosystem	✓	✓	✓
	4.	Farming Systems	✓	✓	✓
FORCES AND ENERGY	1.	Conversion and Conservation of Energy	✓	✓	✓
	2.	Electricity and Electronics	✓	✓	✓
	3.	Force and Motion	✓	✓	✓
	4.	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 a Component of the Environment	x	✓	✓

BASIC 7

STRAND 1: DIVERSITY OF MATTER

SUB-STRAND 1: MATERIALS

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B7/JHS1.1.1.1 **Recognise materials as importantresources for providinghuman needs**	**B7/JHS1.1.1.1.1 Classify materials into liquids, solids and gases** **Exemplars:** 1. Create and complete a table to record the texture, appearance, colour and shape of a group of materials assembled from the environment. 2. Group materials into liquids, solids and gases. 3. Discuss the differences among liquids, solids and gases. 4. Give examples of solids, liquids and gases that can be identified from your environment	**Creativity and Innovation (CI), Critical Thinking and Problem solving (CP), Communication and Collaboration (CC)** **CI 5.2:** Ability to merge simple/complex ideas to create novel situations or things. **CP 5.1:** Ability to combine information and ideas from several sources to reach a conclusion **CC 8.2:** Explain ideas in a clear order with relevant details, using correct construction and structure of speech. **CP 5.6:** Demonstrate a thorough understanding of a generalised concept and facts specific to a task or situation

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	B7/JHS1.1.1.1.2 Discuss the importance of liquids in the life ofhumans **Exemplars:** 1. Present a report on the importance of liquids to human life using the internet to search for information 2. In groups of 3 or 4 let learners describe the need to preserve liquids for human use. **Note** the grouping should be mixed sex unless it is one sex school 3. Record liquids they see being used in their community.	Communication and Collaboration (CC), Critical Thinking and Problem solving (CP) **CC 8.1:** Speak clearly and explain ideas **CC 8.5:** Vary the level of detail and the language use when presenting to make it appropriate to the audience. **CP 5.2:** Analyse and make distinct judgements about viewpoints expressed in an argument. **CP 5.1:** Ability to combine information and ideas from sources to reach a conclusion.
	B7/JHS1.1.1.1.3 Discuss the importance of specific solids to life **Exemplars:** 1. Identify solids in the environment that support the survival of humans and other life forms. 2. Use a search on the internet to obtain information to explain the need to preserve useful solid materials in the environmentfor life. 3. Model objects from solid materials that can be useful to humans and other life forms.	**Critical Thinking and Problem solving (CP), Creativity and Innovation (CI)** **CP 5.1:** Ability to combine information and ideas from several sources to reach a conclusion. **CP 5.2:** Analyse and make distinct judgement about viewpoints expressed in an argument **CP 5.7:** Provide new insight into controversial situation or task. **CI 5.2:** Ability to merge simple/ complex ideas to create novel situations or things. **CI 6.10:** Reflect on work and explore the thinking behind thoughts and processes.

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B7/JHS1.1.1.2 Understandthe periodic table as different elements made up of metals and non-metals and noble gases arranged in an order	**B7/JHS1.1.1.2.1 Demonstrate the knowledge of the orderly arrangement of metals, non-metals and noble gases in the periodic table** **Exemplars:** 1. Name and write the chemical symbol of the first 20 elements in the periodic table. 2. Identify metals, non-metals and noble gases in the periodic table. 3. Deduce from the periodic table that the elements are arranged in order of their atomic number and those in the same group have common properties.	Digital Literacy (DL), Critical Thinking and Problem Solving (CP) **DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. **CP 5.1:** Ability to combine Information and ideas from several sources to reach a conclusion. **CP 5.6:** Demonstrate a thorough understanding of a generalised concept and facts specific to the task or situation.

STRAND 1: DIVERSITY OF MATTER

SUB-STRAND 2: LIVING CELLS

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B7/JHS1.1.2.1 Demonstrate understanding of the structure of organisms and functions of cells in living systems	**B7/JHS1.1.2.1.1 Describe the structure and function ofliving cells of an animal** **Exemplars:** 1. Identify and describe the structure of an animal cell seen in a video, a chart and a magnifier. 2. State the function of each organelle in the animal cell. 3. Look at a sample of animal cell from different parts of an animal with a microscope, magnifier or watch a video or pictures of cells and draw the conclusion that animals are made up of cells. 4. Draw and label an animal cell. 5. Develop a model to represent an animal cell.	Digital Literacy (DL), Communication and Collaboration (CC), Critical Thinking and Problem solving (CP), Creativity and Innovation (CI) **DL 5.5:** Evaluate the quality and validity of information **CC 8.2:** Explain ideas in a clear order with relevant detail, using correct construction and structure of speech **CP 5.7:** Provide new insight into controversial situation or task **DL 6.6:** Knowledge and recognition of ethical use of information **CI 6.5:** Anticipate and overcome difficulties relating to taking initiatives **CI 5.3:** Identification of requirements of a given situation and justification of more than one creative tool that will be suitable

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	B7/JHS1.1.2.1.2 State the functions of each organelle ina plant cell. **Exemplars:**	Digital Literacy (DL), Communication and Collaboration (CC), Critical Thinking and Problem (CP), Creativity and Innovation (CI)
	1. Identify and describe the structure of a plant cell as seen in a video, a chart, pictures and magnifiers.	**CC 8.1:** Speak clearly and explain ideas. **DL 5.3:** Ability to find and utilise digital content.
	2. State the function of each organelle in the plant cell.	**CC 8.1:** Speak clearly and explain ideas.
	3. Look at a sample of a plant cell from different parts of a plant with a microscope, magnifier or, watch a video or pictures and confirm that plants are made up of cells**.**	**CP 5.1:** Ability to combine Information and ideas from several sources to reach a conclusion. **DL 6.4:** Adhere to behavioural protocols that prevail in cyberspace.
	4. Draw and label a plant cell.	**CI 6.5:** Anticipate and overcome difficulties relating to taking initiatives.
	5. Develop a model to represent a plant cell.	**CI 5.3:** CI 5.3: Identification of requirements of a given situation and justification of more than one creative tool that will be suitable.

STRAND 2: CYCLES

SUB-STRAND 1: EARTH SCIENCE

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B7/JHS1.2.1.1 Recognise thatthe water cycle is an example of repeated patterns of change in nature and understand how it occurs	**B7/JHS1.2.1.1.1 Explain how the water cycle occurs as a repeatedpattern in nature** **Exemplars:** 1. Identify the natural sources of water and list the stages of the water cycle: evaporation, condensation, precipitation and transpiration while watching pictures and videos. 2. 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. 3. Explain why the water cycle is a repeated pattern in nature by searching the internet, books, journals, TV news, radio news and any other sources.	Critical Thinking and Problem Solving (CP) Digital Literacy (DL), Creativity and Innovation (CI) **DL5 .1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. **CI 5.2:** Ability to merge simple/complex ideas to create novel situations or things. **CI 6.3:** Ability to select the most effective creative tools for work, and give reasons for the choice. **CP 5.1:** Ability to combine information and ideas from several sources to reach a conclusion. **DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem.

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	B7/JHS1.2.1.1.2 Describe the importance of the water cycle in nature **Exemplars:** 1. Describe the stages of the water cycle by watching a video or a picture of it. 2. Describe the importance of the water cycle in terms of: a) Energy source (release of energy to warm the environment) b) Carrier of nutrients c) Improving water table d) Regulating weather pattern e) Provision of clean water. 3. With a diagram, illustrate the importance of the water cycle in a	Communication and Collaboration (CC), Digital Literacy (DL), Creativity and Innovation (CI), Critical Thinking and Problem Solving (CP) **CC 8.1:** Speak clearly and explain ideas **DL 5.6:** Preparedness to make better decisions using available information. **CP 5.1:** Ability to combine information and ideas from several sources to reach a conclusion. **CC 8.2:** Explain ideas in a clear order with relevant detail, using correct construction and structure of speech. **CI 5.2:** Ability to merge simple/complex ideas to create novel situations or things.

STRAND 2: CYCLES

SUB-STRAND 2: LIFE CYCLE OF ORGANISMS

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B7/JHS1.2.2.1 Demonstrate the skills of carrying out activities to show the stages of the life cycle ofa housefly, the effects of its activities on humans and how to reduce them	**B7/JHS1.2.2.1.1 Describe the life cycle of the housefly** **Exemplars:** 1. Identify and describe the stages of the life cycle of the housefly. 2. Show the order of the stages of the life cycle of the housefly e.g. eggs → larva → pupa → adult. Arrange flashcards or the cut-outs to illustrate the stages. 3. Draw each stage of the life cycle of the housefly and use arrows to link the stages to make the cycle complete. 4. Write notes on each of the stages of the housefly.	Communication and Collaboration (CC), Digital Literacy (DL) **DL 5.3:** Ability to find and utilise digital content. **CC 8.1:** Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group. **DL 5.6:** Preparedness to make better decisions using available information. **CC 9.6:** Ability to work with all group members to complete a task successfully. **CI 5.5:** Ability to try new alternatives and different approaches. **CI 6.2:** Ability to reflect on approaches to creative tasks and evaluate the effectiveness of tools used. **CC 8.2:** Explain ideas in a clear order with relevant details, using correct construction and structure of speech.

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	B7/JHS1.2.2.1.2 Discuss the activities of the housefly as a menace tohumans and show how to reduce the effects of those activities **Exemplars:** 1. Describe with the aid of drawings, pictures and cartoons to demonstrate their knowledge of housefly's feeding habit. e.g. feeding on dead animals, rotten food, manure, solid and liquid waste. 2. Discuss how the activities of the housefly affect humans in terms of: a) transfer of types of diseases (such as dysentery). b) food poisoning. c) nuisance in the environment. 3. Design an intervention that can reduce the effects of the activities of the housefly on humans and educate people of your community about the intervention.	Creativity and Innovation (CI), Communication and Collaboration (CC), Digital Literacy (DL) **CI 5.1:** Examine alternatives in creating new things. **CI 6.6:** Being open minded, adapting and modifying ideas to achieve creative results. **CC 8.1:** Speak clearly and explain ideas. **DL5 .1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. **CI 5.3:** Identification of requirements of a given situation and justification of more than one creative tool that will be suitable. **CI 6.3:** Ability to select the most effective creative tools for work and give reasons for the choice. **DL 5.6:** Preparedness to make better decisions using available information.

STRAND 2: CYCLES

SUB-STRAND 3: CROP PRODUCTION

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B7/JHS1.2.3.1 Demonstrate understanding of the different plant nutrients (organic, and inorganic fertilizers) and their application in school farming (school gardening)	**B7/JHS1.2.3.1.1 Observe and list all plant nutrient sources available in a community and categorise them into organic and inorganicnutrient sources.** **Exemplars:** 1. Create a table to explain the differences between organic and inorganic plant nutrients. 2. Compare the volumes of organic and inorganic nutrient source required by different plants.	Communication and Collaboration (CC), Critical Thinking and Problem Solving (CP) **CI 5.2:** Ability to merge simple/complex ideas to create novel situations or things. **CP 5.6:** Demonstrate a thorough understanding of a generalised concept and facts specific to task or situation. **CP 5.7:** Provide new insight into controversial situation or task.
	B7/JHS1.2.3.1.2 Describe the physical characteristics of different plant nutrients (organic and inorganic) and how each is appliedto plants in the field **Exemplars:** 1. Identify each plant nutrient source and explain how its physical structure and appearance affect its application. 2. Describe in groups how each type of nutrient source may be applied to plants in the field (e.g. school garden). 3. Demonstrate practical application of each type of nutrient source to plants in the field (e.g. school garden).	**Digital Literacy (DL), Communication and Collaboration (CC), Creativity and Innovation (CI)** **DL 5.5:** Evaluate the quality and validity of information. **CC 8.2:** Explain ideas in a clear order with relevant detail, using correct construction and structure of speech. **CC 9.1:** Demonstrate behaviour and skills of working towards group goals. **CC 9.5:** Appreciate the importance of including all team members in discussions and actively encourage contributions from them. **CI 5.5:** Ability to try new alternatives and different approaches.

STRAND 2: CYCLES

SUB-STRAND 4:ANIMAL PRODUCTION

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B7/JHS1.2.4.1 Demonstratean understanding of the differences among domestic animals such as ruminants, monogastrics and poultry (monogastric herbivore)	**B7/JHS1.2.4.1.1 Examine and list domestic animals in the community.** **Exemplars:** 1. Identify different types of domestic animals in the community. 2. Match different domestic animals with their breeds. 3. List and discuss the characteristics, such as shape, colour, size, food/ feeding and others, that can be used to classify domestic animals.	Digital Literacy (DL), Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC) **DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. **CP 5.6:** Demonstrate a thorough understanding of a generalised concept and facts specific to task or situation. **DL 5.6:** Preparedness to make better decisions using available information. **CC 9.1:** Demonstrate behaviour and skills of working towards group goals. **CC 8.2:** Explain ideas in a clear order with relevant detail, using correct construction and structure of speech.

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	B7/JHS1.2.4.1.2 Show the differences and similarities among domestic animals. **Exemplars:** 1. Classify domestic animals into ruminants, monogastrics and poultry. 2. Give examples of animals classified as ruminants, monogastrics, and poultry. 3. Discuss and write the differences among ruminants, monogastrics and poultry. 4. Write similarities in the nature and characteristics of ruminants, monogastrics and poultry in Ghana and other countries.	Digital Literacy (DL), Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC) **CP 5.6:** Demonstrate a thorough understanding of a generalised concept and facts specific to task or situation. **CC 8.1:** Speak clearly and explain ideas **DL 5.3:** Ability to find and utilise digital content. **DL5 .1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. **CC 8.2:** Explain ideas in a clear order with relevant details, using the correct construction and structure of speech. **CP 5.1:** Ability to combine information and ideas from several sources to reach a conclusion. **CP 5.1:** Ability to combine information and ideas from several sources to reach a conclusion. **CP 5.2:** Analyse and make distinct judgements about viewpoints expressed in an argument.

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B7/JHS1.2.4.2 Show an understanding of the usefulness of the different types of animals for domestic and commercial purposes	**B7/JHS1.2.4.2.1 Discuss and write the domestic and commercial usesof different types of animals** **Exemplars:** 1. Explain the concepts of domestic use and commercial use of animals. 2. Make a poster of any two domestic animals that are useful and describe the domestic uses of ruminants, monogastrics and poultry.	Digital Literacy (DL), Communication and Collaboration **DL 6.6:** DL 6.6: Knowledge and recognition of ethical use of information. **CC 8.2:** Explain ideas in a clear order with relevant details, using correct construction and structure of speech. **CC 8.1:** Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group. **DL 5.5:** Evaluate the quality and validity of information.

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	B7/JHS1.2.4.2.2 Observe and compare the uses of the different typesof animals. **Exemplars:** 1. Make a research on animals in your communities by observing them and discuss their different uses 2. List and match the different domestic animals to their commercial uses including their by-products (such as animal waste)	Digital Literacy (DL), Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC) **CC 7.1:** Identify words or sentences in context appropriately. **CC 8.1:** Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group. **DL 5.5:** Evaluate the quality and validity of information. **CP 5.6:** Demonstrate a thorough understanding of a generalised concept and facts specific to task or situation. **DL5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. **CP 5.2:** Analyse and make distinct judgement about viewpoints expressed in an argument.

STRAND 3: SYSTEMS

SUB-STRAND 1:THE HUMAN BODY SYSTEM

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B7/JHS1.3.1.1 Show an understanding of the concept of food, and the process of digestion and appreciate its importance in humans	**B7/JHS1.3.1.1.1 Explain the concept of food and the need for humansto eat** **Exemplars:** 1. Explain what food is, the nutrients found in them and deduce its definition.	Digital Literacy (DL), Critical Thinking and Problem Solving (CP) **DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. **CP 5.1:** Ability to combine information and ideas from several sources to reach a conclusion.
	2. Compare and contrast the appearance of people who have been starved for some period of time with those who have been eating and look healthy and strong.	**DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. **DL 6.6:** Knowledge and recognition of ethical use of information. **CP 5.8:** Identify and prove misconceptions about a generalised concept or fact specific to a task or situation.
	3. Deduce from the comparison in Exemplar 2 the importance of feeding in humans.	**CP 5.1:** Ability to combine information and ideas from several sources to reach a conclusion.

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	B7/JHS1.3.1.1.2 Examine what happens to food at the stages ofdigestion in humans **Exemplars:** 1. Identify the parts of the alimentary canal in a drawing of the digestive system. 2. Research and describe what happens to food e.g. a piece of boiled yam / cassava / plantain / cocoyam / bread, egg, meat, orange, palm oil andmany others when it gets into the mouth, stomach, large and small intestines. 3. Draw and label the digestive system of humans.	Digital Literacy (DL), Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Creativity and Innovation (CI) **CC 7.4:** Identify underlying themes, implications and issues when listening. **DL 5.5:** Evaluate the quality and validity of information. **DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. **DL 6.4:** Adhere to behavioural protocols that prevail in cyberspace. **DL 6.6:** Knowledge and recognition of ethical use of information. **CP 5.4:** Generate hypotheses to help answer complex problems. **CP 5.8:** Identify and prove misconceptions about a generalised concept or fact specific to a task or situation. **CI 6.2:** Ability to reflect on approaches to creative tasks and evaluate the effectiveness of tools used.

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	B7/JHS1.3.1.1.3 Identify the end product of digestion of starchy,protein and oily foods and explain how absorption of the digested food occurs in humans **Exemplars:** 1. Observe and describe how digested food is absorbed into the body of humans using animation. 2. Draw a flow chart to show that starch is digested to sugar, protein is digested to amino acids and oils are digested into fatty acids. 3. Perform practical tests on food: starch, glucose, protein and fats and oils.	Digital Literacy (DL), Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Creativity and Innovation (CI) **DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem **CC 8.1:** Speak clearly and explain ideas **CI 5.3:** CI 5.3: Identification of requirements of a given situation and justification of more than one creative tool that will be suitable **CI 5.2:** Ability to merge simple/complex ideas to create novel situations or things **CC 9.3:** Understand roles during group activities **PL 6.3:** Ability to manage time effectively

STRAND 3: SYSTEMS

SUB-STRAND 2:THE SOLAR SYSTEM

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B7/JHS1.3.2.1 Demonstrate knowledge of the inner planets of the solar system and understand their movement in the system	**B7/JHS1.3.2.1.1 Identify the inner planets of the solar system and describe their properties** **Exemplars:** 1. Identify and describe what constitutes the inner planets of the solar system using pictures, videos, etc. 2. Describe the galaxy, milky way, and elliptical shape of the paths of movement of the inner planets. 3. Design and construct a model of the solar system.	Digital Literacy (DL), Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Creativity and Innovation (CI) **DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem **CC 8.1:** Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group **CC 8.2:** Explain ideas in a clear order with relevant detail, using correct construction and structure of speech **DL 5.3:** Ability to find and utilise digital content **CP 5.8:** Identify and prove misconceptions about a generalised concept or fact specific to a task or situation **CI 5.1:** Examine alternatives in creating new things **CI 5.3:** Identification of requirements of a given situation and justification of more than one creative tool that will be suitable **CI 6.6:** Being open-minded, adapting and modifying ideas to achieve creative results

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	B7/JHS1.3.2.1.2 Discuss the properties and the relative motions ofthe planets Mercury and Venus **Exemplars:** 1. Outline properties peculiar to each of the planets Mercury and Venus. 2. Describe the movement of the planets Mercury and Venus around the Sun.	Digital Literacy (DL), Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Creativity and Innovation (CI) **DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. **CP 5.6:** Demonstrate a thorough understanding of a generalised concept and facts specific to task or situation. **DL 5.5:** Evaluate the quality and validity of information. **CC 8.2:** Explain ideas in a clear order with relevant details, using correct construction and structure of speech. **CP 5.1:** Ability to combine information and ideas from several sources to reach a conclusion.

STRAND 3: SYSTEMS

SUB-STRAND 3: ECOSYSTEM

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B7/JHS1.3.3.1 **Recognise the components of and interdependencesin an ecosystem, and appreciate their interactions**	**B7/JHS1.3.3.1. 1 Analyse the components of ecosystems and identifythe interactions within.** **Exemplars:** 1. Describe an ecosystem as a self-sustaining unit in which components interact. E.g. a pond, a forest and many others. 2. Group ecosystems into terrestrial, aquatic and arboreal categories.	Digital Literacy (DL), Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Creativity and Innovation (CI) **CC 9.6:** Ability to work with all group members to complete a task successfully. **CC 8.1:** Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group. **CC 8.4:** Anticipate different responses from the audience and plan for them. **DL 5.5:** Evaluate the quality and validity of information. **DL 5.6:** Preparedness to make better decisions using available information. **CP 5.1:** Ability to combine Information and ideas from several sources to reach a conclusion. **CP 6.7:** Implement strategies with accuracy.

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	3. Identify and list the components, such as biotic and abiotic, of each category of ecosystem.	**DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. **CC 8.1:** Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group. **CP 5.6:** Demonstrate a thorough understanding of a generalised concept and facts specific to task or situation.
	4. Differentiate among organisms in the different ecosystems mentioned in Exemplar 2.	**CP 5.2:** Analyse and make distinct judgement about viewpoints expressed in an argument.
	5. Explain how the components of the different ecosystems affect one another.	**CC 8.1:** Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group.

STRAND 3: SYSTEMS

SUB-STRAND 4: FARMING SYSTEMS

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B7/JHS1.3.4.1 Demonstratean understanding of the differences amongthe various farming systems: Land Rotation, Crop Rotation, Mixed Cropping, Mixed Farming, and Organic Farming	**B7/JHS1.3.4.1.1 Examine and discuss the differences among thevarious farming systems** **Exemplars:** 1. Identify and define types of farming systems in Ghana and elsewhere. 2. Discuss the characteristics of the different farming systems in Ghana.	Digital Literacy (DL), Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Creativity and Innovation (CI), Cultural Identity and Global Citizenship (CG) **DL 5.3:** Ability to find and utilise digital content. **DL 6.1:** Understand the sociological and emotional aspects of cyberspace. **CG 5.4:** Develop and exhibit a sense of cultural identity. **CC 8.1:** Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group. **DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. **CP 5.1:** Ability to combine Information and ideas from several sources to reach a conclusion. **CG 5.3**: Develop and exhibit a sense of

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	3. Compare and contrast the characteristics of the different farming systems.	**CP 5.4:** Generate hypotheses to help answer complex problems **CP 5.2:** Analyse and make distinct judgment about viewpoints expressed in an argument **CP 5.1:** Ability to combine Information and ideas from several sources to reach a conclusion
	B7/JHS1.3.4.1.2 Categorise different farming systems **Exemplars:** 1. Classify different descriptions of farming systems under Land Rotation, Crop Rotation, Mixed Cropping, Mixed Farming and Organic Farming.	**Digital Literacy (DL), Critical Thinking and Problem Solving (CP), Cultural Identity and Global Citizenship (CG)** **CP 5.1:** Ability to combine Information and ideas from several sources to reach a conclusion **CG 5.2:** Develop and exhibit ability to defend one's cultural beliefs, practices and norms **DL 5.3:** Ability to find and utilise digital content
	2. Group farming systems prevailing in their community under Land Rotation, Crop Rotation, Mixed Cropping, Mixed Farming and Organic Farming.	**CP 5.1:** Ability to combine Information and ideas from several sources to reach a conclusion

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	B7/JHS1.3.4.1.3 Discuss the usefulness of different farming systems **Exemplars:** 1. Discuss and tabulate the reasons behind the use of various farming systems. 2. Debate the merits and demerits of the different farming systems.	Critical Thinking and Problem Solving (CP), Creativity and Innovation (CI) Cultural Identity and Global Citizenship (CG) **CC 8.5:** Vary the level of detail and the language used when presenting to make it appropriate to the audience. **CI 5.5:** Ability to try new alternatives and different approaches. **CP 5.4:** Generate hypotheses to help answer complex problems. **CP 5.1:** Ability to combine information and ideas from several sources to reach a conclusion. **CP 6.7:** Implement strategies with accuracy **CC 8.5:** Vary the level of detail and the language used when presenting to make it appropriate to the audience. **CG 5.3:** Develop and exhibit a sense of cultural identity.

STRAND 4: FORCES AND ENERGY

SUB-STRAND 1: ENERGY

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B7/JHS1.4.1.1 Demonstrate an understanding of forms of energy and their daily applications	**B7/JHS1.4.1.1.1 Identify the various forms of energy and show howthey are related.** **Exemplars:** 1. List forms of energy in terms of Potential, Kinetic, Heat, Sound, Solar, Electrical, Nuclear, Chemical and Light. 2. Demonstrate and show by diagrams how Potential Energy (PE) is related to Kinetic Energy (KE) ; (Mechanical Energy= PE+ KE).	Digital Literacy (DL), Cultural Identity and Global Citizenship (CG), Communication and Collaboration (CC) **DL 5.3:** Ability to find and utilise digital content. **DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. **CC 8.2:** Explain ideas in a clear order with relevant detail, using correct construction and structure of speech. **CC 8.5:** Vary the level of detail and the language used when presenting to make it appropriate to the audience. **CI 5.2:** Ability to merge simple/complex ideas to create novel situations or things. **CI 6.2:** Ability to reflect on approaches to creative tasks and evaluate the effectiveness of tools used. **CI 5.4:** Ability to visualise alternatives, see possibilities, and identify problems and challenges.

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	B7/JHS1.4.1.1.2 Explain daily applications of forms of energy. **Exemplars:** 1. Discuss how forms of energy are used in daily life. 2. Match forms of energy to appliances (gadgets) used daily at school, in the home and community. 3. Explain factors that affect Potential and Kinetic energy in their application in daily life.	Digital Literacy (DL), Cultural Identity and Global Citizenship (CG), Communication and Collaboration (CC), Creativity and Innovation (CI) **CC 8.1:** Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group. **DL 5.5:** Evaluate the quality and validity of information. **DL 6.6:** Knowledge and recognition of ethical use of information. **CP 5.6:** Demonstrate a thorough understanding of a generalised concept and facts specific to task or situation. **CI 5.2:** Ability to merge simple/complex ideas to create novel situations or things. **DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. **CC 8.2:** Explain ideas in a clear order with relevant details, using correct construction and structure of speech.

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	4. 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.	**CI 5.4:** Ability to visualise alternatives, see possibilities, and identify problems and challenges. **CI 6.8:** Recognise and generalise information and experience; search for trends and patterns. **CI 6.9:** Interpret and apply learning in new context. **CI 6.10:** Reflect on work and explore the thinking behind thoughts and processes.
B7/JHS1.4.1.2 Demonstrate an understanding of the concept of heat transfer and its applications in life	**B7/JHS1.4.1.2.1 Explain and demonstrate how heat is transferred invarious media** **Exemplar:** 1. Explain how heat is transferred through different media (gas, plastic, metal, liquid). 2. Carry out an activity to show how heat is transferred through different media.	**Digital Literacy (DL), Communication and Collaboration (CC)** **DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. **CC 8.2:** Explain ideas in a clear order with relevant detail, using correct construction and structure of speech. **CI 5.4:** Ability to visualise alternatives, see possibilities, and identify problems and challenges.

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B7/JHS1.4.1.3 Demonstrate understanding of characteristics of light, such as travelling in a straight line, reflection, refraction and dispersion	**B7/JHS1.4.1.3.1 Demonstrate how light travels in a straight line.** **Exemplars:** 1. Perform experiments to show that light travels in a straight line and can be reflected and refracted and produce reports, posters or diagrams. 2. Perform an experiment to show dispersion of light into colours.	Digital Literacy (DL), Communication and Collaboration (CC), Critical Thinking and Problem Solving (CP), Creativity and Innovation (CI) **DL 5.3:** Ability to find and utilise digital content. **CI 5.6:** Understand and use analogies and metaphors. **CI 5.7:** Putting forward constructive comments, ideas, explanations and new ways of doing things. **CI 6.8:** Recognise and generalise information and experience; search for trends and patterns. **CP 5.6:** Demonstrate a thorough understanding of a generalised concept and facts specific to task or situation. **CP 5.7:** Provide new insight into controversial situation or task. **CP 5.8:** Identify and prove misconceptions about a generalised concept or fact specific to a task or situation. **CC 8.2:** Explain ideas in a clear order with relevant detail, using correct construction and structure of speech. **CC 9.1:** Demonstrate behaviour and skills of working towards group goals.

STRAND 4: FORCES AND ENERGY

SUB-STRAND 2: ELECTRICITY AND ELECTRONICS

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B7/JHS1.4.2.1 Demonstrate understanding of forms of electricity, its generation and effects on the environment.	**B7/JHS1.4.2.1.1 Describe the various forms of electricity generation** **Exemplar:** 1. Search for and discuss information about the nature and generation of thermal and nuclear electricity and produce reports, posters, diagrams and charts about your findings.	Digital Literacy (DL), Communication and Collaboration (CC), **DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. **DL 5.6**: Preparedness to make better decisions using available information. **CC 8.2:** Explain ideas in a clear order with relevant detail, using correct construction and structure of speech.
	B7/JHS1.4.2.1.2 Explain the impact of electricity generation on theenvironment. **Exemplar:** 1. Debate the negative effects of both thermal and nuclear electricity generation on the environment and how to reduce the effects. Create posters leaflets of the outcome of the debate	**Communication and Collaboration (CC), Critical Thinking and Problem Solving (CP), Creativity and Innovation (CI)** **CP 5.4:** Generate hypotheses to help answer complex problems. **CP 5.1:** Ability to combine Information and ideas from several sources to reach a conclusion. **CP 6.7:** Implement strategies with accuracy. **CC 8.5:** Vary the level of detail and the language used when presenting to make it appropriate to the audience.

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B7/JHS1.4.2.2 Demonstrate knowledge of how to assemble and explain the functions of basic electronic components and their interdependence in an electronic circuit	**B7/JHS1.4.2.2.1 Demonstrate how to assemble basic electronic components in an electronic circuit.** **Exemplar:** 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.	Digital Literacy (DL), Creativity and Innovation (CI) **DL 5.3:** Ability to find and utilise digital content **CI 6.8:** Recognise and generalise information and experience; search for trends and patterns
	B7/JHS1.4.2.2.2 Discuss the function of each electronic componentand their interdependence with each other. **Exemplars:** 1. Dismantle and assemble spoilt electronic gadgets such as radio, TV, mobile phones, electronic watches and others that can be found in the home and at school and name the parts. 2. 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. 3. Explain what happens when the switch in an electronic circuit is closed and when it is opened.	**Communication and Collaboration (CC), Creativity and Innovation (CI)** **CI 6.6:** Being open-minded, adapting and modifying ideas to achieve creative results **CI 6.8:** Recognise and generalise information and experience; search for trends and patterns **CI 5.2:** Ability to merge simple/complex ideas to create novel situations or things **CI 6.8:** Recognise and generalise information and experience; search for trends and patterns **CI 6.6:** Being open-minded, adapting and modifying ideas to achieve creative results **CC 8.2:** Explain ideas in a clear order with relevant detail, using correct construction and structure of speech **CI 6.8:** Recognise and generalise information and experience; search for trends and patterns

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	B7/JHS1.4.2.2.3 Discuss the function of each electronic component such as resistor, diode, and inductor, and their interdependence for the functioning of an electronic gadget **Exemplar:** 1. Discuss the roles and the significance of the following electronic components in a circuit and how they affect each other: i. LED, ii. Resistor, iii. Diode, and iv. Inductor. 2. Explain changes in brightness in an LED in relation to addition of resistors, diodes, and inductors in an electronic circuit	Communication and Collaboration (CC), Creativity and Innovation (CI), Critical Thinking and Problem Solving (CP) **CC 8.2:** Explain ideas in a clear order with relevant detail, using correct construction and structure of speech **CP 5.6:** Demonstrate a thorough understanding of a generalised concept and facts specific to task or situation **CP 5.7:** Provide new insight into controversial situation or task **CC 8.2:** Explain ideas in a clear order with relevant detail, using correct construction and structure of speech **CP 5.6:** Demonstrate a thorough understanding of a generalised concept and facts specific to task or situation **CP 5.7:** Provide new insight into controversial situation or task

STRAND 4: FORCES AND ENERGY

SUB-STRAND 3: CONVERSION AND CONSERVATION OF ENERGY

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B7/JHS1.4.3.1. Demonstrate an understanding of the principle of conservation and conversion of energy and their application in real life situations	**B7/JHS1.4.3.1.1 Explain the principle underlying conservation andconversion of energy.** **Exemplars:** 1. Explain the law of conservation of energy by using diagram to show that in a closed system the value of chemical energy, for example in dry cell which changes into electrical, heat and light energy will remain the same. 2. Use exemplar 1 to explain energy conversion and its application to life.	Digital Literacy (DL), Creativity and Innovation (CI), Critical Thinking and Problem Solving (CP) **DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem. **CP 5.1:** Ability to combine information and ideas from several sources to reach a conclusion. **CI 5.2:** Ability to merge simple/complex ideas to create novel situations or things. **CI 6.8:** Recognise and generalise information and experience; search for trends and patterns. **CI 6.6:** Being open-minded, adapting and modifying ideas to achieve creative results.
	B7/JHS1.4.3.1.2 Demonstrate the conversion of energy into useableforms. **Exemplar:** 1. Illustrate everyday use of conversion of energy and show diagrammatically the conversion of energy to other forms.	Creativity and Innovation (CI) **CI6.9:** Interpret and apply learning in new context. **CI 6.8:** Recognise and generalise information and experience; search for trends and patterns. **CI 6.10:** Reflect on work and explore the thinking behind thoughts and processes.

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	B7/JHS1.4.3.1.3 Know how energy could be conserved for future usein life. **Exemplar:** 1. Describe how energy is conserved and explain how it can be done for the benefit of humans and other life forms.	Digital Literacy (DL), Communication and Collaboration (CC), Critical Thinking and Problem Solving (CP) **DL5 .1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem **CP 5.1:** Ability to combine information and ideas from several sources to reach a conclusion **CC 8.2:** Explain ideas in a clear order with relevant details, using correct construction and structure of speech

STRAND 4: FORCES AND ENERGY

SUB-STRAND 4: FORCE AND MOTION

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B7/JHS1.4.4.1 Examine the concept of motion, Newton's first law of motion, magnetic force in relation to motion and understand their applications to life.	**B7/JHS1.4.4.1.1 Understand that unbalanced forces acting on anobject cause it to move.** **Exemplars:** 1. Explain inertia as a tendency of a body to resist motion.	Digital Literacy (DL), Communication and Collaboration (CC) **CC 8.2:** Explain ideas in a clear order with relevant detail, using correct construction and structure of speech
	2. Demonstrate how unbalanced forces cause motion.	**CP 5.1:** Ability to combine information and ideas from several sources to reach a conclusion **CI: CI 6.9:** Interpret and apply learning in new context **DL 5.5**: Evaluate the quality and validity of information

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	B7/JHS1.4.4.1.2 State and explain Newton's First Law of motion. **Exemplar:** 1. Research to find what Newton's first law is and discuss it.	Digital Literacy (DL), Communication and Collaboration (CC), and Creativity and Innovation (DI) **DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem **DL 6.4:** Adhere to behavioural protocols that prevail in cyberspace **DL 6.6:** Knowledge and recognition of ethical use of information **CC 8.2:** Explain ideas in a clear order with relevant detail, using correct construction and structure of speech **CI 5.2:** Ability to merge simple/complex ideas to create novel situations or things **CI 6.8:** Recognise and generalise information and experience; search for trends and patterns **CI 6.6:** Being open-minded, adapting and modifying ideas to achieve creative results

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	B7/JHS1.4.4.1.3 Examine the application of Newton's First Law ofmotion in life. **Exemplars:** 1. Discuss some applications of Newton's First Law of Motion. E.g. when a metallic ball is put on a smooth surface and given a push it will be in motion until it gets to a blockade and it stops. Use of seat belts in a vehicle, etc. 2. Explain the importance of Newton's First Law of Motion.	Communication and Collaboration (CC), Critical Thinking and Problem Solving (CP), Creativity and Innovation (CI) **CC 8.2:** Explain ideas in a clear order with relevant detail, using correct construction and structure of speech **CC 9.5:** Appreciate the importance of including all team members in discussions and actively encourage contributions from them **DL 5.5:** Evaluate the quality and validity of information **CP 5.1:** Ability to combine Information and ideas from several sources to reach a conclusion **CI 5.2:** Ability to merge simple/complex ideas to create novel situations or things **CI 6.8:** Recognise and generalise information and experience; search for trends and patterns **CI 6.6:** Being open-minded, adapting and modifying ideas to achieve creative results **CC 8.2:** Explain ideas in a clear order with relevant detail, using correct construction and structure of speech **CC 9.5:** Appreciate the importance of including all team members in discussions and actively encourage contributions from them **CP 5.1:** Ability to combine Information and ideas from several sources to reach a conclusion

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	B7/JHS1.4.4.1.4 Demonstrate the behaviour of magnet and its use tolife. **Exemplars:** 1. Discuss what magnets are and describe the types of magnets that exist 2. Demonstrate the characteristics (Repulsive, attractive, and orientation N-S direction) of a magnet. 3. Discuss the uses of magnet in everyday life.	Communication and Collaboration (CC), Critical Thinking and Problem Solving (CP), Creativity and Innovation (CI) **CC 8.2:** Explain ideas in a clear order with relevant detail, using correct construction and structure of speech **CI 5.2:** Ability to merge simple/complex ideas to create novel situation or thing **CP 5.1:** Ability to combine Information and ideas from several sources to reach a conclusion
B7/JHS1.4.4.2 Recognise somesimple machines, and show understanding of their efficiency in doing work.	**B7/JHS1.4.4.2.1 Identify simple machines.** **Exemplar:** 1. List examples of simple machines.	**Digital Literacy (DL), Communication and Collaboration (CC)** **DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem **CC 8.1:** Speak clearly and explain ideas

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	B7/JHS1.4.4.2.2 Describe the types and functions of levers. **Exemplars:** 1. Name the types of levers and explain their general functions. 2. Classify levers into first, second and third classes and demonstrate how the principals involved in each class make work easier in everyday life.	Digital Literacy (DL), Communication and Collaboration (CC), Critical Thinking and Problem Solving (CP) **DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem **CC 8.1:** Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group **CP 5.6:** Demonstrate a thorough understanding of a generalised concept and facts specific to task or situation **CP 6.7:** Implement strategies with accuracy
	B7/JHS1.4.4.2.3 Know work input, and output and efficiency as theyapply to machines. **Exemplar:** 1. Explain the terms work input, work output and efficiency.	**Digital Literacy (DL), Communication and Collaboration (CC), Critical Thinking and Problem Solving (CP), Creativity and Innovation (CI)** **CC 8.2:** Explain ideas in a clear order with relevant details, using correct construction and structure of speech **DL 5.3:** Ability to find and utilise digital content. Recognise ownership of information

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	2. Explain efficiency of a machine as the ratio of work output to work input expressed as a percentage.	**CC 8.2:** Explain ideas in a clear order with relevant details, using correct construction and structure of speech **DL 5.3:** Ability to find and utilise digital content **CP 5.1:** Ability to combine information and ideas from several sources to reach a conclusion. Develop and defend a logical plausible resolution to a confusion, uncertainty or contradiction surrounding an event
	3. Explain the concept of efficiency of a machine.	**CC 8.2:** Explain ideas in a clear order with relevant detail, using correct construction and structure of speech **DL 5.3:** Ability to find and utilise digital content **CP 5.1:** Ability to combine Information and ideas from several sources to reach a conclusion
	4. Describe how efficiency of simple machines can be improved (e.g. by oiling its parts to reduce friction).	**DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem **CI 6.8:** Recognise and generalise information and experience; search for trends and patterns **CI 6.6:** Being open-minded, adapting and modifying ideas to achieve creative results **CI 5.7:** Putting forward constructive comments, ideas, explanations and new ways of doing things

STRAND 4: FORCES AND ENERGY

SUB-STRAND 5: AGRICULTURAL TOOLS

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B7/JHS1.4.5.1 Demonstrate knowledge and skills in handling and maintenance of basic and simple agricultural tools	**B7/JHS1.4.5.1.1 Explain the basic rules in handling and maintainingsimple agricultural tools.** **Exemplars:** 1. List some simple or basic farm tools in agriculture (give examples found in animal and crop farms). 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.	Communication and Collaboration (CC), Critical Thinking and Problem Solving (CP), Creativity and Innovation (CI), Digital Literacy (DL), Cultural Identity and Global Citizenship (CG) **DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem **CG 5.2:** Develop and exhibit ability to defend one's cultural beliefs, practices and norms **CP 5.6**: Demonstrate a thorough understanding of a generalised concept and facts specific to task or situation **CP 5.6:** Demonstrate a thorough understanding of a generalised concept and facts specific to task or situation **CI 5.2:** Ability to merge simple/complex ideas to create novel situations or things **CI 6.8:** Recognise and generalise information and experience; search for trends and patterns **CI 6.6:** Being open-minded, adapting and modifying ideas to achieve creative results **CC 8.1:** Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group **CI 5.5:** Ability to try new alternatives and different approaches

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	B7/JHS1.4.5.1.2 Apply the handling and maintenance of basic and simple agricultural tools in their community.	Communication and Collaboration (CC), Critical Thinking and Problem Solving (CP), Creativity and Innovation (CI), Digital Literacy(DL), Cultural Identity and Global Citizenship(CG)
	Exemplars: 1. Observe and discuss the handling and maintenance of basic and simple agricultural tools used in farms visited in the community and write a report.	**CC 7.2:** Interpret correctly and respond to non-verbal communication such as facial expressions, cues and gestures **CC 7.4:** Identify underlying themes, implications and issues when listening **CC 8.3:** Apply appropriate diction, and structure sentences correctly for narrative, persuasive, imaginative and expository purposes **CP 5.2:** Analyse and make distinct judgementabout viewpoints expressed in an argument
	2. Assemble agricultural tools from the community and practice handling the tools to perform simple agricultural operations. Writedown the operational rules of handling agricultural tools.	**DL 5.1:** Ability to ascertain when informationis needed and be able to identify, locate, evaluate and effectively use it to solve a problem **CG 5.2:** Develop and exhibit ability to defend one's cultural beliefs, practices and norms **CI 5.3:** Identification of requirements of a given situation and justification of more thanone creative tool that will be suitable **CI 6.2:** Ability to reflect on approaches to creative tasks and evaluate the effectiveness of tools used **CI 6.3:** Ability to select the most effective creative tools for work and give reasonsfor the choice

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	3. Assemble agricultural tools from the community and practice the basic rules in tools maintenance and list the rules used.	**CI 5.7:** Putting forward constructive comments, ideas, explanations and new ways of doing things **CI 6.8:** Recognise and generalise information and experience; search for trends and patterns **CI 6.10:** Reflect on work and explore the thinking behind thoughts and processes

STRAND 5: HUMANS AND THE ENVIRONMENT

SUB-STRAND 1:WASTE MANAGEMENT

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B7/JHS1.5.1.1 **Exhibit knowledge and skill of scientific basis for management practices of types of waste in the environment**	**B7/JHS1.5.1.1.1 Apply information from research on good management practices of waste to make the environment clean.** **Exemplars:** 1. Research for information on good waste management practices and use it to carry out a project to make the environment clean. 2. Write a report for presentation on the outcome of the project carried out in Exemplar 1. 3. Discuss how to manage types of waste and explain the science underlying it.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital Literacy (DL), Creativity and Innovation (CI) **CP 5.1:** Ability to combine Information and ideas from several sources to reach a conclusion **DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem **CP 5.2:** Analyse and make distinct judgement about viewpoints expressed in an argument **CC 8.1:** Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group

STRAND 5: HUMANS AND THE ENVIRONMENT

SUB-STRAND 2: HUMAN HEALTH

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B7/JHS1.5.2.1 Demonstrate knowledge of common deficiency diseases of humans, their causes, symptoms, effects and prevention	**B7/JHS1.5.2.1.1 Explain the relationship between food nutrients andcommon deficiency diseases and how they affect humans.** **Exemplars:** 1. Name and analyse food nutrients such as carbohydrates, proteins, fatty acids, and their uses in the human body. 2. Discuss and make presentations on deficiency diseases associated with lack of food nutrients such as carbohydrates, proteins, fatty acids, vitamins and others in the human body. 3. Relate the nutrients they gain or lack to the foods they normally eat e.g. lack of protein leads to kwashiorkor, lack of iron lead to anaemia, etc. 4. Describe symptoms, effects and prevention of common deficiency diseases such as night blindness, rickets, scurvy, kwashiorkor and others.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital Literacy (DL), and Creativity and Innovation (CI) **CP 5.5:** Effectively evaluate the success of solutions used in an attempt to solve a complex problem **CI 5.2:** Ability to merge simple/complex ideas to create novel situations or things **CP 5.6:** Demonstrate a thorough understanding of a generalised concept and facts specific to task or situation **CC 8.2:** Explain ideas in a clear order with relevant details, using correct construction and structure of speech **CP 5.1:** Ability to combine Information and ideas from several sources to reach a conclusion

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B7/JHS1.5.2.2 Demonstrate knowledge of the nature of selected viral, diseasesof humans, their causes, symptoms, effects and management	**B7/JHS1.5.2.2.1 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** **Exemplars** 1. Discuss the nature of viral diseases 2. 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. Describe the symptoms, effects and prevention of COVID-19), Ebola, and H1N1 diseases and why they are declared pandemic. 4. Describe the role of individuals, community members and government in managing COVID-19 Ebola, and H1N1 diseases. 5. Design and produce a poster to educate their community members on the incidence and control of named viral diseases: COVID-19, Ebola, and H1N1.	Critical Thinking and Problem Solving (CP), Digital Literacy (DL), Communication and Collaboration (CC), Creativity and Innovation (CI) **CP 5.1:** Ability to combine Information and ideas from several sources to reach a conclusion **DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem **CC 8.1:** Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group **CC 8.1:** Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group **CI 5.2:** Ability to merge simple/complex ideas to create novel situations or thing

STRAND 5: HUMANS AND THE ENVIRONMENT

SUB-STRAND 3: SCIENCE AND INDUSTRY

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B7/JHS1.5.3.1 Realise how careers in science can improve human life, and research about Ghanaian and internationally recognised scientists and science educators and model after them	**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** **Exemplars:** 1. Describe various careers in science and relate them to the work of national scientists. E.g. Prof. Ibok Oduro, Prof. Francis Allotey, Prof. Ewurama Addy, and Science Educationists: Prof. Anamuah-Mensah, Prof. Theophilus Ossei-Anto, Prof. Christian Anthony-Krueger and others. 2. 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 presentations. 3. Research, and build portfolio on the impact of science and technology and innovation in homes, schools, communities, and the universe and make a presentation. 4. Identify the science and technology careers that Ghana must focus on and give reasons.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital Literacy (DL), Creativity and Innovation (CI) **CP 5.1:** Ability to combine information and ideas from several sources to reach a conclusion **CP 5.1:** Ability to combine information and ideas from several sources to reach a conclusion **CC 8.1:** Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group **DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem **CP 5.1:** Ability to combine information and ideas from several sources to reach a conclusion

STRAND 5: HUMANS AND THE ENVIRONMENT

SUB-STRAND 4: CLIMATE CHANGE AND GREEN ECONOMY

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B7/JHS1.5.4.1 Demonstrate understanding of sustainable energy choices and their impact on the environment	**B7/JHS1.5.4.1.1 Search for information on ways sustainable energy choices and scientific ideas are used to protect the environment.** **Exemplars:** 1. Describe how people use sustainable energy choices and scientific ideas to protect the environment. 2. Analyse greenhouse effects on the environment and show how they can be minimised. 3. Design a project to show how energy can be locally sustained through the use of scientific processes to protect the environment.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital Literacy (DL), Creativity and Innovation (CI) **CP 5.1:** Ability to combine information and ideas from several sources to reach a conclusion **CP 5.1:** Ability to combine Information and ideas from several sources to reach a conclusion **CP 5.4:** Generate hypotheses to help answer complex problems

STRAND 5: HUMANS AND THE ENVIRONMENT

SUB-STRAND 5: UNDERSTANDING THE ENVIRONMENT

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B7/JHS1.5.5.1 Demonstrate understanding of different plants and animals found in different land forms and how they survive (with emphasis land forms in Ghana)	**B7/JHS1.5.5.1.1 List and describe the different types of plants and animals that live in different land forms such as plateau plain,mountain valley and others (with emphasis on land forms in Ghana).** **Exemplars:** 1. Identify different types of plants and animals found in different landforms (plateau plain, mountain valley and others). 2. Describe the characteristics that enable different types of animals to live in different landforms (plateau plain, mountain valley and others). 3. Describe the characteristics that enable different types of plants to survive in different landforms (plateau plain, mountain valley and others). 4. Make an album of different types of plants and animals that live in different landforms (plateau plain, mountain valley and others).	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital Literacy (DL), Creativity and Innovation (CI) **CP 5.5:** Effectively evaluate the success of solutions used in an attempt to solve a complex problem **CP 5.1:** Ability to combine information and ideas from several sources to reach a conclusion **CP 5.1:** Ability to combine information and ideas from several sources to reach a conclusion **CP 5.4:** Generate hypothesis to help answer complex problems

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	B7/JHS1.5.5.1.2 Explain the nature of associations that exist among plants and animals in different landforms and their mechanisms for survival **Exemplars:** 1. Describe the nature of associations such as mutualism, parasitism, commensalism among plants and animals and explain the effects on their habitats. 2. Carry out research about the different ways that different plants and animals survive in the landforms in which they are found.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital Literacy (DL), Creativity and Innovation (CI) **CP 5.6:** Demonstrate a thorough understanding of a generalised concept and facts specific to task or situation **CC 8.5:** Vary the level of detail and the language used when presenting to make it appropriate to the audience **DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem

BASIC 8

STRAND 1: DIVERSITY OF MATTER

SUB-STRAND 1: MATERIALS

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B8/JHS2.1.1.1. Demonstrate knowledge of types of mixtures, and understanding of the processes of scientific ways of separating the components of mixtures	**B8/JHS2.1.1.1.1 Identify types of mixtures by name andcharacteristics** **Exemplars:** 1. Group materials such as powder, pebbles, bottle tops, salt, sugar, sand, gari, gravel, oil, water and others into two main categories: solids and liquids. 2. Put any two of the materials (in 1) together and describe the resultant nature of the product formed. 3. Draw observable conclusions on homogeneous and heterogeneous characteristics from mixtures of two or more materials such as *sand and gravel; sand and water; oil and water.* 4. Compare and contrast solutes and solvents based on their physical characteristics. 5. Identify and separate mixtures such as *sand and sugar mixture, sugar and salt mixture* and solutions such as *salt solution, sugar solution, fruitjuice, vinegar solution* based on their physical properties. 6. Identify a suspension as a type of mixture e.g. *mixture of groundnut paste and water in a glass.*	Critical Thinking and Problem solving (CP), Communication and Collaboration (CC) **CP 5.1:** Ability to combine information and ideas from several sources to reach a conclusion **CP 5.2:** Analyse and make distinct judgement about viewpoints expressed in an argument **CP 6.2:** Ability to explain plans for attaining goals **CP 5.2:** Analyse and make distinct judgement about viewpoints expressed in an argument **CC 8.2:** Explain ideas in a clear order with relevant detail, using correct construction and structure of speech **CP 6.3:** Ability to select alternative(s) that adequately meet selected criteria **CP 6.4:** Ability to identify important and appropriate criteria and use them to evaluate alternatives

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	7. Differentiate between a colloid and a suspension and show the *colloidal effect.*	**CP 5.2:** Analyse and make distinct judgement about viewpoints expressed in an argument **CC 8.1:** Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group
	B8/JHS2.1.1.1.2 Design and perform processes for separating kinds ofmixtures. **Exemplar:** 1. Perform activities such as distilling, filtering, sieving and others to separate different kinds of mixtures and present a report on your findings using drawing and written work.	**Creativity and Innovation (CI), Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital Literacy (DL)** **CI 5.1:** Examine alternatives in creating new things **CC 7.5:** Identify and analyse different points of views of speaker

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B8/JHS2.1.1.2 Demonstrate understanding of atoms and the atomic structure of elements in the periodic table	**B8/JHS2.1.1.2.1 Describe atoms as composed of sub-atomic particles** **Exemplars:** 1. Explain an atom and its structure of an element using/linking it to the periodic table. 2. List the sub-atomic particles found in the atom and indicate their location in the atom (e.g. proton, electron, neutron). 3. State the electrical charges on the sub-atomic particles. 4. Describe the differences between the atomic number and the mass number of elements. 5. Determine the number of protons, neutrons and electrons in an	**Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC)** **CP 6.4:** Ability to identify important and appropriate criteria and use them to evaluate alternatives **CP 5.1:** Ability to combine information and ideas from several sources to reach a conclusion **CP 6.3:** Identify important and appropriate alternatives **CP 5.2:** Analyse and make distinct judgement about viewpoints expressed in an argument **CP 6.3:** Ability to select alternative(s) that adequately meet selected criteria

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	B8/JHS2.1.1.2.2 Explain the arrangement of elements in terms of thenumber of protons in the nuclei of atoms of each element. **Exemplars:** 1. Explain how elements are arranged in order of the number of protons using the periodic table. 2. Draw the distribution of electrons (electron configuration) in the atoms. 3. Explain the formation of ions. 4. Describe a molecule as a combination of atoms.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), and Digital Literacy (DL) **CP 6.3:** Ability to select alternative(s) that adequately meet selected criteria **CP 5.1:** Ability to combine information and ideas from several sources to reach a conclusion **DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem **CP 5.6:** Demonstrate a thorough understanding of a generalised concept and facts specific to task or situation **CP 5.3:** Create simple logic trees to think through problems

STRAND 1: DIVERSITY OF MATTER

SUB-STRAND 2: LIVING CELLS

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B8/JHS2.1.2.1 Demonstrate an understanding of the types of cells and their structure in relation to different organisms	**B8/JHS2.1.2.1.1 Examine and describe the structure of prokaryoticand eukaryotic cells.** **Exemplars:** 1. Compare and contrast prokaryotic and eukaryotic cells. 2. Create a table to show a chart or a slideshow depicting images and labels of the types of cells. Identify their differences and similarities after observation. 3. Draw and label a prokaryotic cell and a eukaryotic cell and make a presentation on what is observed.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital Literacy (DL), Creativity and Innovation (CI) **CP 6.4:** Ability to identify important and appropriate criteria and use them to evaluate alternatives **DL 5.5:** Evaluate the quality and validity of information **CP 6.3:** Ability to select alternative(s) that adequately meet selected criteria **CC 7.5:** Identify and analyse different points of views of speaker
	B8/JHS2.1.2.1.2 Classify organisms (plants or animals) as prokaryoticor eukaryotic based on the type of cells they are made of **Exemplars:** 1. Observe and list examples of organisms; plants and animals as prokaryotic or eukaryotic based on each cell type. 2. Explain the impact of prokaryotes and eukaryotes on humans health and devise safety measures to protect them.	**Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital Literacy (DL), Creativity and Innovation (CI)** **CP 6.3:** Ability to select alternative(s) that adequately meet selected criteria **DL 5.5:** Evaluate the quality and validity of information **CP 6.2:** Ability to explain plans for attaining goals **CC 8.2:** Explain ideas in a clear order with relevant details, using correct construction and structure of speech

STRAND 2: CYCLES

SUB-STRAND 1: EARTH SCIENCE

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B8/JHS2.2.1.1 Demonstrate understanding of the process of Carbon cycle as an example of repeated pattern of change in nature and how it relates to the environment	**B8/JHS2.2.1.1.1 Explain the process of the carbon cycle.** **Exemplars:** 1. Identify the carbon cycle from the internet, charts or pictures and write short notes on what happens at each stage. 2. Produce a flow chart to trace the process of the carbon cycle in nature. 3. Explain the process of the carbon cycle depicting processes such as a) Photosynthesis b) Respiration c) Burning d) Decay. 4. Compile information on the carbon cycle and give reasons why it is a repeated pattern e.g. it is because the carbon is circulated continuously in the environment.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital Literacy (DL), Creativity and Innovation (CI) **DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem **CP 6.3:** Ability to select alternative(s) that adequately meet selected criteria **CC 8.2:** Explain ideas in a clear order with relevant detail, using correct construction and structure of speech **CP 6.4:** Ability to identify important and appropriate criteria and use them to evaluate alternatives **CC 8.2:** Explain ideas in a clear order with relevant detail, using correct construction and structure of speech **DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem **CC 8.2:** Explain ideas in a clear order with relevant detail, using correct construction and structure of speech

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	B8/JHS2.2.1.1.2 Describe the role of the carbon cycle to theenvironment. **Exemplars:** 1. Describe the role of the carbon cycle in maintaining balance in the composition of air in the environment. E.g. plants absorb carbon in the form of Carbon (IV) Oxide from the air for photosynthesis and oxygen is produced for respiration and in return, respiration gives out carbon in the form of Carbon (IV) Oxide. ***Note:*** Discuss photosynthesis and respiration in plants as part of the carbon cycle. 2. Explain the effect of the carbon cycle on food chains, using diagrams. 3. Describe the relationship between greenhouse gases and the carbon cycle.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital Literacy (DL), and Creativity and Innovation (CI) **CP 5.5:** Effectively evaluate the success of solutions used in an attempt to solve a complex problem **CC 8.2:** Explain ideas in a clear order with relevant detail, using correct construction and structure of speech **CP 5.5:** Effectively evaluate the success of solutions used in an attempt to solve a complex problem **DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem **CP 6.1:** Ability to effectively define goals towards solving a problem

STRAND 2: CYCLES

SUB-STRAND 2: LIFE CYCLE OF ORGANISMS

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B8/JHS2.2.2.1 Demonstrate anactivity to show the life cycle of the Anopheles mosquito and show how the effects of the mosquito on humans can be managed	**B8/JHS2.2.2.1.1 Describe the life cycle and economic importance ofthe Anopheles mosquito** **Exemplars:** 1. Observe and draw the different stages of the life cycle of the *Anopheles* mosquito e.g. by breeding the mosquito in a glass jar. 2. Describe the economic importance of the *Anopheles* mosquito.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital Literacy (DL), Creativity and Innovation (CI) **CP 6.4:** Ability to identify important and appropriate criteria and use them to evaluate alternatives **DL 5.5:** Evaluate the quality and validity of information **CP 6.2:** Ability to explain plans for attaining goals **CC 8.2:** Explain ideas in a clear order with relevant detail, using correct construction and structure of speech
	B8/JHS2.2.2.1. 2 Discuss the impact of the Anopheles mosquito onhumans and how it can be controlled. **Exemplars:** 1. Discuss the impact of the female *Anopheles* mosquito as a vector of plasmodium on humans. 2. Generate solutions to control malaria in Ghana.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital Literacy (DL), Creativity and Innovation (CI) **CC 8.2:** Explain ideas in a clear order with relevant detail, using correct construction and structure of **speech** **CP 6.1:** Ability to effectively **define** goals towards solving a problem

STRAND 2: CYCLES

SUB-STRAND 3: CROP PRODUCTION

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B8/JHS2.2.3.1 Demonstrate knowledge and skills in planting crops on different seed beds.	**B8/JHS2.2.3.1.1 Explore the different seed beds for planting crops inyour community.** **Exemplars:** 1. Observe and discuss different seed beds for planting different crops. 2. List and compare the differences and similarities among seed beds in the community. 3. Match the types of seed beds with the types and stages of crops planted in your community.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital Literacy (DL), Creativity and Innovation (CI) **CP 6.2:** Ability to explain plans for attaining goals **CP 5.3:** Create simple logic trees to think through problems **CP 5.3:** Create simple logic trees to think through problems
	B8/JHS2.2.3.1.2 Plant different types of crops on different seed beds. **Exemplars:** 1. Observe and discuss the practice of planting different crops in different seed beds. 2. Select different plant parts, (seeds, seedlings, cuttings, leaves, roots)	**Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital Literacy (DL), and Creativity and Innovation (CI)** **CP 6.2:** Ability to explain plans for attaining goals **CC 8.2:** Explain ideas in a clear order with relevant details, using correct construction and structure of speech **CP 6.2:** Ability to explain plans for attaining goals

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B8/JHS2.2.3.2 Demonstrate understanding of the differences in height, size, and flowering of crops grown in different seed beds	**B8/JHS2.2.3.2.1 Compare and contrast the differences in height,size, and flowering of crops grown in different seed beds** **Exemplars:** 1. Measure the heights, sizes, number of flowers, and number of fruits of plants grown in different seed beds. 2. Discuss the differences and similarities in the heights, sizes, number of flowers and fruits of plants grown in different seed beds using tables and graphs. 3. Write and give presentations on the reasons for differences in the heights, sizes, number of flowers and fruits of plants grown in different seed beds.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital Literacy (DL), and Creativity and Innovation (CI) **CP 5.5:** Effectively evaluate the success of solutions used in an attempt to solve a complex problem **CP 5.2:** Analyse and make distinct judgements about viewpoints expressed in an argument **CC 8.2:** Explain ideas in a clear order with relevant details, using correct construction and structure of speech

STRAND 2: LIFE CYCLES OF ORGANISMS

SUB-STRAND 4:ANIMAL PRODUCTION

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B8/JHS2.2.4.1 Recognise thedifferent types of feed for different types of animals	**B8/JHS2.2.4.1.1 Compare and contrast the different types of feed fordifferent types of animals** **Exemplars:** 1. Match the different types of feed with different types of animals. 2. Discuss the types of nutrients and their sources in the different types of animal feed. 3. Select and discuss appropriate feed for animal based on the proportions of nutrients indicated on the package or labels.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital Literacy (DL), Creativity and Innovation (CI) **CP 6.1:** Ability to effectively define goals towards solving a problem **CP 5.5:** Effectively evaluate the success of solutions used in an attempt to solve a complex problem **CP 5.5:** Effectively evaluate the success of solutions used in an attempt to solve a complex problem

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B8/JHS2.2.4.2 Demonstrate understanding of the importance of water and animal feed to the growth of animals.	**B8/JHS2.2.4.2.1 Explain the importance of water and animal feed tothe growth of animals** **Exemplars:** 1. List and discuss the usefulness of water and feed for the growth and reproduction of animals. 2. Predict what will happen to animals who are not provided with adequate water.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital Literacy (DL), Creativity and Innovation (CI) **CP 5.6:** Demonstrate a thorough understanding of a generalised concept and facts specific to task or situation **CC 8.2:** Explain ideas in a clear order with relevant details, using correct construction and structure of speech **CP 5.5:** Effectively evaluate the success of solutions used in an attempt to solve a complex problem **CC 8.2:** Explain ideas in a clear order with relevant details, using correct construction and structure of speech

STRAND 3: SYSTEMS

SUB-STRAND 1:THE HUMAN BODY SYSTEM

CONTENT STANDARD	INDICATOR AND EXEMPLARS	CORE COMPETENCIES
B8/JHS2. 3.1.1 Demonstrate knowledge of parts of mammalian tooth and the functions of the different types of teeth in relation to feeding in man	**B8/JHS2.3.1.1.1 Identify parts of a mammalian tooth** **Exemplars:** 1. Label parts, such as crown, neck, and root of a mammalian tooth. 2. Explain the functions of each part of the mammalian tooth of humans.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital Literacy (DL), Creativity and Innovation (CI) **CP 6.4:** Ability to identify important and appropriate criteria and use them to evaluate alternatives **DL 5.5:** Evaluate the quality and validity of information **CC 8.1:** Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group
	B8/JHS2.3.1.1.2 Discuss the functions of the different types of teethsuch as incisors, canines, premolars, and molars. **Exemplars:** 1. Discuss the functions of the different types of human teeth. 2. Draw the different types of teeth.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital Literacy (DL), Creativity and Innovation (CI), Creativity and Innovation **CC 8.5:** Vary the level of detail and the language used when presenting to make it appropriate to the audience **CP 6.7:** Implement strategies with accuracy **DL 5.5:** Evaluate the quality and validity of information

CONTENT STANDARD	INDICATOR AND EXEMPLARS	CORE COMPETENCIES
	B8/JHS2.3.1.1.3 Explain the causes and prevention of tooth and gumdecay. **Exemplars:** 1. Describe the causes of tooth decay, gum diseases and formation of plaque and the proper way of preventing tooth decay. 2. Demonstrate proper ways of cleaning the teeth.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital Literacy (DL), Creativity and Innovation (CI) **CP 6.4:** Ability to identify important and appropriate criteria and use them to evaluate alternatives **CC 8.5:** Vary the level of detail and the language used when presenting to make it appropriate to the audience **CP 5.6:** Demonstrate a thorough understanding of a generalised concept and facts specific to task or situation

STRAND 3: SYSTEMS

SUB-STRAND 2:THE SOLAR SYSTEM

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B8/JHS2.3.2.1 Demonstrate knowledge of the outerplanets of the solar system	**B8/JHS2.3.2.1.1 Identify the outer planets of the solar system anddescribe their properties** **Exemplars:** **1.** Describe the composition of the solar system using charts, pictures and digital content. **2.** Identify and draw the planets that form the outer solar system. **3.** Discuss the properties that are peculiar to each of the planet: Jupiter, Saturn, Uranus, and Neptune. **4.** Search and explain why there is no life on Jupiter, Saturn, Uranus, and Neptune. **5.** Construct a model of the outer solar system (Jupiter, Saturn, Uranus, and Neptune**)** and display it for discussion.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital Literacy (DL), Creativity and Innovation (CI) **CC 8.5:** Vary the level of detail and the language used when presenting to make it appropriate to the audience **CP 6.4:** Ability to identify important and appropriate criteria and use them to evaluate alternatives **CP 6.4:** Ability to identify important and appropriate criteria and use them to evaluate alternatives **DL 5.5:** Evaluate the quality and validity of information **CP 5.2:** Analyse and make distinct judgement about viewpoints expressed in an argument

STRAND 3: SYSTEMS

SUB-STRAND 3: ECOSYSTEM

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B8/JHS2.3.3.1 Demonstratean understanding of the interdependence of organisms in an ecosystem and their interaction	**B8/JHS2.3.3.1.1 Explore the feeding relationships within an ecosystem** **Exemplars:** 1. Discuss how life on earth will be like without the sun. 2. Explain the terms: producer, primary consumer, secondary consumer, food chain and food web as applied in energy transfer in an ecosystem. 3. Illustrate with diagrams how energy from the sun flows through a food chain and food web in an ecosystem.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital Literacy (DL), Creativity and Innovation (CI) **CP 6.4:** Ability to identify important and appropriate criteria and use them to evaluate alternatives **CC 8.5:** Vary the level of detail and the language used when presenting to make it appropriate to the audience **CP 5.3:** Create simple logic trees to think through problems

STRAND 3: SYSTEMS

SUB-STRAND 4: FARMING SYSTEMS

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B8/JHS2.3.4.1 Demonstrate understanding of the different crop, animal and land combinations under various farming systems	**B8/JHS2.3.4.1.1 Identify and describe the types of crops, animals andland combinations for the different farming systems** **Exemplars:** 1. Describe the types of crops, animals and land combinations in the different farming systems in your community. 2. Discuss the advantages and disadvantages of each farming system identified.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital Literacy (DL), Creativity and Innovation (CI) **CC 8.5:** Vary the level of detail and the language used when presenting to make it appropriate to the audience **CC 8.5:** Vary the level of detail and the language used when presenting to make it appropriate to the audience **CP 6.4:** Ability to identify important and appropriate criteria and use them to evaluate alternatives
	B8/JHS2.3.4.1.2 Discuss the usefulness of the different crops and animals involved in the different farming systems. **Exemplars:** 1. Explain how the different components of farming systems contribute to each other. 2. Discuss and write down the contributions of crops and animals towards the sustainability of each farming system.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital Literacy (DL), Creativity and Innovation (CI) **CP 5.2:** Analyse and make distinct judgement about viewpoints expressed in an argument **CC 8.5:** Vary the level of detail and the language used when presenting to make it appropriate to the audience **CP 5.2:** Analyse and make distinct judgement about viewpoints expressed in an argument

STRAND 4: FORCES AND ENERGY

SUB-STRAND 1: ENERGY

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B8/JHS2.4.1.1 Demonstrate the skill to evaluate the conversion of energy from one form to another	**B8/JHS2.4.1.1.1 Describe energy conversion** **Exemplar:** 1. Describe how energy is converted from one form to another.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital Literacy (DL), Creativity and Innovation (CI) **CP 5.2:** Analyse and make distinct judgement about viewpoints expressed in an argument **CC 8.5:** Vary the level of detail and the language used when presenting to make it appropriate to the audience
	B8/JHS2.4.1.1.2 Discuss the importance of conversion of energy. **Exemplars:** 1. Explain the processes that a dammed river goes through to produce electricity. 2. Describe how to harness natural forms of energy into other forms.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital Literacy (DL), and Creativity and Innovation (CI) **CP 5.2:** Analyse and make distinct judgement about viewpoints expressed in an argument **CP 5.2:** Analyse and make distinct judgement about viewpoints expressed in an argument **CP 5.2:** Analyse and make distinct judgement about viewpoints expressed in an argument **CC 8.5:** Vary the level of detail and the language used when presenting to make it appropriate to the audience

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B8/JHS2.4.1.2 Show an understanding of the sources of renewable energy and how to manage these sources in a sustainable manner	**B8/JHS2.4.1.2.1 Describe renewable and non-renewable forms of energy** **Exemplars:** 1. Explain renewable and non-renewable sources of energy. 2. Identify the various sources of renewable and non-renewable forms of energy and classify them e.g. wind, coal, hydro, crude oil, natural gas, solar and biogas. 3. Describe how to produce energy from a renewable source.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital Literacy (DL), Creativity and Innovation (CI) **CC 8.2:** Explain ideas in a clear order with relevant detail, using correct construction and structure of speech **CP 5.2:** Analyse and make distinct judgement about viewpoints expressed in an argument **CP 5.2:** Analyse and make distinct judgement about viewpoints expressed in an argument **CC 8.5:** Vary the level of detail and the language used when presenting to make it appropriate to the audience
	B8/JHS2.4.1.2.2 Demonstrate how to manage sources of renewableenergy sustainably. **Exemplars:** 1. Research about information on the stages involved in managing renewable energy sources. 2. Create a table to describe challenges associated with the management of different sources of renewable energy.	**Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital Literacy (DL), Creativity and Innovation (CI)** **DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem **CP 5.6:** Demonstrate a thorough understanding of a generalised concept and facts specific to task or situation

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B8/JHS2.4.1.3 Demonstrate an understanding of the relationship between heat and temperature.	**B8/JHS2.4.1.3.1 Discuss the differences and the relationship betweenheat and temperature in the environment.** **Exemplars:** 1. Create a table to show the distinguishing features of temperature and heat. 2. Discuss the relationship between temperature and heat.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital Literacy (DL), Creativity and Innovation (CI) **CP 5.6:** Demonstrate a thorough understanding of a generalised concept and facts specific to task or situation **CC 8.5:** Vary the level of detail and the language used when presenting to make it appropriate to the audience

STRAND 4: FORCES AND ENERGY

SUB-STRAND 2: ELECTRICITY AND ELECTRONICS

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B8/JHS2.4.2.1 Demonstrate knowledge of electricity transmission	**B8/JHS2.4.2.1.1 Explain how electricity transmission occurs.** **Exemplars:** 1. Identify different stages of electricity transmission. 2. Draw a flow chart to show the stages of electricity transmission from the point of generation to the point of consumption.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital Literacy (DL), Creativity and Innovation (CI) **CP 5.1:** Ability to combine Information and ideas from several sources to reach a conclusion **CP 5.3:** Create simple logic trees to think through problems
B8/JHS2.4.2.2 Demonstrate understanding of the functions of capacitors in relation to LEDs, Diodes and resistors in electronic circuits	**B8/JHS2.4.2.2.1 Demonstrate the charging and discharging action ofa capacitor in a DC electronic circuit** **Exemplars:** 1. Research information about capacitors in electronic circuits and explain their functions when connected with direct current (DC). 2. Describe the charging and discharging actions of a capacitor and explain the role of LEDs, diodes and resistors in an electronic circuit.	**Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Creativity and Innovation (CI)** **DL 5.5:** Evaluate the quality and validity of information **CC 8.2:** Explain ideas in a clear order with relevant details, using correct construction and structure of speech **CP 5.1:** Ability to combine Information and ideas from several sources to reach a conclusion

STRAND 4: FORCES AND ENERGY

SUB-STRAND 3: CONVERSION AND CONSERVATION OF ENERGY

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B8/JHS2.4.3.1 **Evaluate theimpact of conversionof energy and energy conservation on the environment**	**B8/JHS2.4.3.1.1. Explain the importance of conversion of energy andenergy conservation in daily life** **Exemplars:** 1. Classify the importance of energy conversion and energy conservation in daily life. 2. Search from multimedia sources, books, internet for information on the impact of energy. 3. Conversion and conservation in their environment, and make a poster presentation on their findings.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Creativity and Innovation (CI), Digital Literacy (DL) **CP 5.1:** Ability to combine Information and ideas from several sources to reach a conclusion **DL 5.5:** Evaluate the quality and validity of information **CC 8.2:** Explain ideas in a clear order with relevant details, using correct construction and structure of speech

STRAND 4: FORCES AND ENERGY

SUB-STRAND 4: FORCE AND MOTION

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B8/JHS2.4.4.1 Demonstratethe production of magnet, domestic and industrial application of Magnetic force and its relationship with Newton's Second law of motion and in everyday life	**B8/JHS2.4.4.1.1 Demonstrate simple ways of making magnets andshow how magnetic force can be applied in domestic and industrial activities**	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Creativity and Innovation (CI), Digital Literacy (DL)
	Exemplars: 1. Produce magnets (using magnetic materials such as pieces of iron and bar magnet; and electricity). 2. Demonstrate some application of magnetic force in domestic and industrial activities (E. g. compass, alarms, loud speakers, etc.). 3. Explore other industrial and domestic applications of magnetic force and present findings.	**CI 5.1:** Examine alternatives in creating new things **CP 5.6:** Demonstrate a thorough understanding of a generalised concept and facts specific to a task or situation **CI 5.1:** Examine alternatives in creating new things **CC 8.1**: Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group
	B8/JHS2.4.4.1.2. Explain the relationship between magnetic forceand Newton's Second Law of motion; and show the law's application to life.	**Critical Thinking and Problem Solving (CP)**
	Exemplars: 1. Explain Newton's Second Law of motion with examples from daily life. 2. Perform an experiment to show the relationship between force and motion using magnetic force, and the principle of Newton's Second Law of Motion.	**CP 5.2:** Analyse and make distinct judgement about viewpoints expressed in an argument **CP 5.2:** Analyse and make distinct judgement about viewpoints expressed in an argument

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B8/JHS2.4.4.2 Demonstrate understanding of complex machines and how they work	**B8/JHS2.4.4.2.1 Identify complex machines and describe their functions in life** **Exemplars:** 1. Recap what simple machines are from B7/JHS1.4.4.2.1 2. Explain what complex machines are and show how different they are from simple machines. 3. Identify simple machine in complex machines. 4. Explain how the functions of a complex machine can improve the quality of life.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Creativity and Innovation (CI), Digital Literacy (DL) **CC 8.2:** Explain ideas in a clear order with relevant details, using correct construction and structure of speech **CP 5.8:** Identify and prove misconceptions about a generalised concept or fact specific to a task or situation **CP 5.9:** Identify and explain a confusion, uncertainty, or a contradiction surrounding an event **CC 8.2:** Explain ideas in a clear order with relevant details, using correct construction and structure of speech

STRAND 4: FORCES AND ENERGY

SUB-STRAND 5: AGRICULTURAL TOOLS

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B8/JHS2.4.5.1 Demonstrate knowledge and skills in the use of basic and simple agricultural tools for basic on-farm activities	**B8/JHS2.4.5.1.1 Show and discuss the use of basic and simple agricultural tools for basic on-farm activities** **Exemplars:** 1. Collect and list different types of agricultural tools used for on-farm activities. 2. Match each tool with the familiar type of agricultural activity it is used for and create an album of the tools.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Creativity and Innovation (CI), Digital Literacy (DL) **CP 5.6:** Demonstrate a thorough understanding of a generalised concept and facts specific to task or situation **CP 5.2:** Analyse and make distinct judgement about viewpoints expressed in an argument
	B8/JHS2.4.5.1.2 Engage in the use of basic and simple agriculturaltools for basic farm activities. **Exemplars:** 1. Explain how the different agricultural tools are used on a farm or school garden to perform specific agricultural activities. 2. Practice the use of different agricultural tools for specific activities on a farm or school garden. 3. Select appropriate tools for specific agriculture tasks.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Creativity and Innovation (CI), Digital Literacy (DL) **CP 5.7:** Provide new insight into controversial situation or task **CI 5.5:** Ability to try new alternatives and different approaches **CP 5.2:** Analyse and make distinct judgement about viewpoints expressed in an argument

STRAND 5: HUMANS AND THE ENVIRONMENT

SUB-STRAND 1:WASTE MANAGEMENT

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B8/JHS2.5.1.1 Demonstrate knowledge of waste management systems and apply it in an environment	**B8/JHS2.5.1.1.1 Explain sustainable waste management practices** **Exemplars:** 1. Outline approaches to waste management in promoting sustainable management. 2. Conduct a survey in a community's waste management practices and present a report.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Creativity and Innovation (CI), Digital Literacy (DL) **CP 5.1:** Ability to combine information and ideas from several sources to reach a conclusion **DL 6.6:** Knowledge and recognition of ethical use of information
	B8/JHS2.5.1.1.2. Apply knowledge of waste management practices tomanage waste in a community **Exemplars:** **1.** Carry out an activity to manage waste using knowledge acquired in indicator **B8/JHS2.5.1.1.1** in their communities. **2.** Evaluate the waste management practices carried out in a community and present a report.	**Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Creativity and Innovation (CI), Digital Literacy (DL)** **CP 6.1:** Ability to effectively define goals towards solving a problem **CP 6.1:** Ability to effectively define goals towards solving a problem **CC 8.2:** Explain ideas in a clear order with relevant details, using correct construction and structure of speech

STRAND 5: HUMANS AND THE ENVIRONMENT

SUB-STRAND 2: HUMAN HEALTH

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B8/JHS2.5.2.1 Demonstrate knowledge of common communicable diseases, such as Hepatitis, of humans, causes, symptoms, effects and their prevention	**B8/JHS2. 5.2.1.1 Explain the symptoms, effects and prevention of common communicable diseases.** **Exemplars:** 1. Compile data on the number of males and females who suffer from common communicable diseases such as hepatitis, from a medical centre and determine the possible causes of these diseases. 2. Identify causes, symptoms, effects and prevention of hepatitis, HIV, measles and others and make a presentation. 3. Search for the causes, symptoms and prevention of hepatitis	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Creativity and Innovation (CI), Digital Literacy (DL) **CP 5.6:** Demonstrate a thorough understanding of a generalised concept and facts specific to task or situation **CP 5.6:** Demonstrate a thorough understanding of a generalised concept and facts specific to task or situation **CC 8.2:** Explain ideas in a clear order with relevant details, using correct construction and structure of speech **CP 5.1:** Ability to combine Information and ideas from several sources to reach a conclusion

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	B8/JHS2. 5.2.1.2. Analyse the risk factors of communicablediseases **Exemplars:** 1. Search for information that is associated with communicable diseases. 2. Create awareness about risk factors of communicable diseases such as hepatitis, HIV, measles and others in order to prevent the diseases in their schools and communities.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Creativity and Innovation (CI), Digital Literacy (DL) **DL 5.5:** Evaluate the quality and validity of information **CC 8.3:** Apply appropriate diction, and structure sentences correctly for narrative, persuasive, imaginative and expository purposes

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B8/JHS2.5.2.2 Demonstrate knowledge of the nature of selected bacterial diseases of humans, their causes, symptoms, effects and prevention	**B8/JHS2. 5.2.2.1 Explain the nature of bacterial diseases with special emphasis on food poisoning/gonorrhoea/ meningitis their causes, symptoms, effects on humansand prevention** **Exemplars:** 1. Discuss the nature of bacterial diseases. 2. Search for information and make presentations on food poisoning, gonorrhoea, and meningitis diseases their mode of transmission from person to person, community to community and from country to country. 3. Describe the symptoms, effects and prevention of food poisoning,, gonorrhoea, and meningitis diseases. 4. Describe the role of individuals, community members and government in managing food poisoning, gonorrhoea, and meningitis diseases. 5. Design and produce a poster to educate their community members on the incidence and control of named bacterial diseases: food poisoning, gonorrhoea, and meningitis.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Creativity and Innovation (CI), Digital Literacy (DL) **CP 5.1:** Ability to combine information and ideas from several sources to reach a conclusion **DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem **CC 8.1:** Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group **CC 8.1:** Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group **CI 5.2:** Ability to merge simple/complex ideas to create novel situations or thing

STRAND 5: HUMANS AND THE ENVIRONMENT

SUB-STRAND 3: SCIENCE AND INDUSTRY

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B8/JHS2.5.3. 1 Demonstratean understanding of connections among science, technology, innovation, society and the environment	**B8/JHS2. 5.3.1.1 Examine the relationship among science, technology, innovation and society.** **Exemplars:** 1. Explain the interrelationship of science and technology and innovation. 2. Discuss technological advancements in the world and its impact on the Ghanaian environment.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Creativity and Innovation (CI), Digital Literacy (DL) **CP 6.1:** Ability to effectively define goals towards solving a problem **CC 8.2:** Explain ideas in a clear order with relevant detail, using correct construction and structure of speech **DL 5.5:** Evaluate the quality and validity of information **CC 8.2:** Explain ideas in a clear order with relevant details, using correct construction and structure of speech, using conjunctions to structure and speech

STRAND 5: HUMANS AND THE ENVIRONMENT

SUB-STRAND 4: CLIMATE CHANGE AND GREEN ECONOMY

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B8/JHS2.5.4.1 Demonstrate an understanding of the effects of climate change in the world and greening of other tropical countries including Ghana.	**B8/JHS2.5.4.1.1 Explain the concept of climate change and its effecton the environment.** **Exemplars:** 1. Describe the signs of climate change.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC),Creativity and Innovation (CI), Digital Literacy (DL) **CP 5.1:** Ability to combine Information and ideas from several sources to reach a conclusion **CC 8.2:** Explain ideas in a clear order with relevant detail, using correct construction and structure of speech
	2. Search for causes and effects of climate change and present a report.	**CP 5.1:** Ability to combine Information and ideas from several sources to reach a conclusion **DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem
	3. Explain how countries in the continents are adapting to climate change for example tree planting and legislation on bush burning.	**CP 5.1:** Ability to combine Information and ideas from several sources to reach a conclusion **DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	B8/JHS2.5.4.1.2. Describe climate change and green economy actions. **Exemplars:** 1. Describe climate change adaptation measures that can be applied in the community. 2. Discuss mitigation strategies that your community can adapt to reduce the effects of climate change.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Creativity and Innovation (CI), Digital Literacy (DL) **CP 5.1:** Ability to combine information and ideas from several sources to reach a conclusion **CC 8.1:** Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group **DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem **CC 8.2:** Explain ideas in a clear order with relevant details, using correct construction and structure of speech **DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem

STRAND 5: HUMANS AND THE ENVIRONMENT

SUB-STRAND 5: UNDERSTANDING THE ENVIRONMENT

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B8/JHS2.5.5.1 Demonstrate understanding of the differences among soils, plant roots, stems, leaves, flowers, and fruits of plants in the different environments	**B8/JHS2.5.5.1.1 Discuss physical properties of soils** **Exemplars:** 1. Collect and describe different samples of soils (sandy soil, loamy soil, clay soil, etc.) from the school garden and the community. 2. Discuss how each soil type retains water and supports the root system of plants. 3. Conduct an experiment to demonstrate how different soil types retain water to support the root system of crops.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Creativity and Innovation (CI), Digital Literacy (DL) **CP 5.1:** Ability to combine information and ideas from several sources to reach a conclusion **CP 5.1:** Ability to combine information and ideas from several sources to reach a conclusion **CC 8.2:** Explain ideas in a clear order with relevant details, using correct construction and structure of speech

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	B8/JHS2.5.5.1.2 Analyse the physical properties of soils and soil water content and demonstrate their importance in crop production. **Exemplars:** 1. Examine and discuss the different physical properties of each soil type and how these properties help support crop production. 2. Observe and describe the growth of different plants on different soil types. 3. Demonstrate how plants absorb water and nutrients from the soil (osmosis).	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Creativity and Innovation (CI), Digital Literacy (DL) **CP 5.5:** Effectively evaluate the success of solutions used in an attempt to solve a complex problem **CP 5.3:** Create simple logic trees to think through problems **CC 8.1:** Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group **CI 5.5:** Ability to try new alternatives and different approaches **CP 5.1:** Ability to combine information from several sources to reach a conclusion
B8/JHS2.5.6.1 Recognise thedifferent types of rocksas origin of different types of soils	**B8/JHS2.5.6.1.1 Observe and describe different types of rocks as origins of soils.** **Exemplars:** 1. Identify different labelled samples of rocks presented in the classroom/laboratory. 2. Describe the visible characteristics of each rock. 3. Collect samples of rocks from around the community and label them rock identification guide and compare them with the labelled laboratory samples in Exemplar 1. 4. Research and report the stages of weathering of rocks to form soil.	Critical Thinking and Problem Solving (CP) Creativity and Innovation (CI) **CP 6.3:** Ability to select alternative(s) that adequately meet selected criteria **CI 6.8:** Recognise and generalise information and experience; search for trends and patterns **CP 6.4:** Ability to identify important and appropriate criteria and use them to evaluate alternatives **CP 6.3:** Identify important and appropriate alternatives

BASIC 9

STRAND 1: DIVERSITY OF MATTER

SUB-STRAND 1: MATERIALS

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B9/JHS3.1.1.1 Show an understanding of formation of binary chemical compounds and their uses (Acids, Bases and Salts)	**B9/JHS3.1.1.1.1 Identify by name binary chemical compounds anddiscuss their uses.** **Exemplars:** 1. Identify and name chemical compounds from a collection of materials commonly found at home, school and the community such as table salt, water, vinegar, fuel (*take precaution),* soap, detergents, marble and fertilisers. 2. Write the chemical symbols of the elements identified in the chemical compounds.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC) **CP 5.1:** Ability to combine Information and ideas from several sources to reach a conclusion **CP 6.1:** Ability to effectively define goals towards solving a **problem**
	B9/JHS3.1.1.1.2 Discuss the formation of binary chemical compounds. **Exemplars:** 1. Distinguish among elements, molecules, ions and compounds. 2. Write molecular formula of binary compounds and describe their formation. 3. Compare and contrast different binary chemical compounds based on their composition and properties.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Creativity and Innovation (CI) **CP 5.6:** Demonstrate a thorough understanding of a generalised concept and facts specific to task or situation **CP 6.6:** Preparedness to recognise and explain results after implementation of plans **CC 9.6:** Ability to work with all group members to complete a task successfully **CP 5.4:** Generate hypotheses to help answer complex problems **CP 6.4:** Ability to identify important and appropriate criteria and use them to evaluate alternatives

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	4. Form models to represent chemical compounds such as water, carbon (IV) oxide, iron (II) sulphide and magnesium oxide.	**CI 5.4:** Examine alternatives in creating new things
	B9/JHS3.1.1.1.3 Describe the characteristics of common acids, basesand salts. **Exemplars:** 1. Identify acids, bases and salts by their characteristics. 2. Create a model of a pH Scale and use it to determine the strength of common acids and alkali solutions using indicators.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Creativity and Innovation (CI) **CP 5.8:** Identify and prove misconceptions about a generalised concept or fact specific to a task or situation **CI 5.4:** Examine alternatives in creating new things **CI 6.5**: Anticipate and overcome difficulties relating to taking initiatives

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B9/JHS3.1.1.2 Demonstrate knowledge of atomic bonding in the formationof chemical compounds	**B9/JHS3.1.1.2.1 Recognise that chemical bond results from theattraction between atoms in a compound** **Exemplars:** 1. Identify types of inter-atomic bonds. 2. Describe the formation of inter-atomic bonds. 3. Identify examples of substances that exhibit ionic, covalent and metallic bonding.	Digital Literacy (DL), Personal Development and Leadership (PL), Communication and Collaboration (CC) **CC 8.1:** Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group **CC 9.2:** Understand and use interpersonal skills **DL 5.3:** Ability to find and utilise digital content **PL 5.1:** Understanding of oneself (strength, weaknesses, goals and aspirations), in reacting and adjusting to novel situations **PL 6.8:** Actively assist group identify changes or modifications necessary in the group activities and work towards carrying out those changes **DL 5.5:** Evaluate the quality and validity of information

STRAND 1: DIVERSITY OF MATTER

SUB-STRAND 2: LIVING CELLS

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B9/JHS3.1.2.1 Demonstrate knowledge of specialist cells of dicotyledonous plants and humans, their formation and functions for the existence of the plants and humans	**B9/JHS3.1.2.1.1 Discuss the concepts of specialised cells and how theyare formed in dicotyledonous plants and humans** **Exemplars:** 1. Brainstorm to bring out the meaning of specialised cells. 2. Discuss how specialised cells are formed in dicotyledonous plants and humans.	Communication and Collaboration (CC), Critical Thinking and Problem Solving (CP) **CC 9.1:** Demonstrate behaviour and skills of working towards group goals **CC 9.1:** Demonstrate behaviour and skills of working towards group goals **CP 6.4:** Ability to identify important and appropriate criteria and use them to evaluate alternatives
	B9/JHS3.1.2.1.2 Examine the functions of specialised cells in dicotyledonous plants such as epidermal, guard cells, cambium, xylem in relation to the existence of the plants **Exemplars:** 1. Observe specialised dicotyledonous plant cells such as *epidermal, guard cells, cambium, xylem* from videos and charts and identify them by their names and shapes. 2. Search from books and the internet for information on the functions of the specialised cells of dicotyledonous plants and how they relate to the existence of the plants.	**Digital Literacy (DL), Critical Thinking and Problem Solving (CP)** **DL 5.3:** Ability to find and utilise digital content **CP 5.1:** Ability to combine Information and ideas from several sources to reach a conclusion **DL 5.3:** Ability to find and utilise digital content **CP 5.1:** Ability to combine Information and ideas from several sources to reach a conclusion

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	B9/JHS3.1.2.1.3 Examine the functions of specialised animal cellssuch as (nerve, blood cells, muscle cells and sperm cells) in relation to the existence of humans **Exemplars:**	Digital Literacy (DL), Critical Thinking and Problem Solving (CP)
	1. Observe specialised animal cells such as nerve cells, blood cells, muscle cells and sperm cells from pictures, videos and charts and identify them by their names and make models to represent their shapes.	**DL 5.3:** Ability to find and utilise digital content **CP 5.1:** Ability to combine information and ideas from several sources to reach a conclusion
	2. Search from books, journals and internet for information on specialised cells in exemplar 1 and how they relate to the existence of humans.	**DL 5.3:** Ability to find and utilise digital content

STRAND 2: CYCLES

SUB-STRAND 1: EARTH SCIENCES

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B9/JHS3.2.1.1 Demonstratean understanding of the Nitrogen cycle as a repeated pattern of change in nature, and how it relates to the environment	**B9/JHS3.2.1.1.1 Explain the process of the nitrogen cycle as arepeated pattern in nature** **Exemplars:** 1. Identify the nitrogen cycle from the internet, charts, or pictures. 2. Explain the nitrogen cycle depicting processes such as: – Nitrogen fixation – Nitrification (converting ammonia into nitrates). – Assimilation (plants and animals using nitrogen) – Ammonification (adding organic nitrogen compounds to ammonia or ammonia formation). – De-nitrification. 3. Explain the relationship between the nitrogen cycle and the environment. 4. Explain why the nitrogen cycle is a repeated pattern in nature.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC) Digital Literacy (DL), Creativity and Innovation (CI) **DL 5.4:** Ability to construct knowledge from a non-linear hyper-textual navigation **CP 5.6:** Demonstrate a thorough understanding of a generalised concept and facts specific to task or situation **CG 5.3:** Develop and express respect, recognition and appreciation of others' cultures **CC 7.3:** Provide feedback in areas of ideas, organisation, voice, word choice and sentence fluency in communication

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	B9/JHS3.2.1.1.2 Describe the importance of the nitrogen cycle to theenvironment **Exemplars:** 1. Describe the importance of nitrogen to the environment. 2. Carry out a project to show how certain plants such as leguminous crops can replenish nitrogen in the soil. 3. Predict what will happen if the nitrogen cycle is interrupted by actions such as leaching, bush burning, and destruction of leguminous plants.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital Literacy (DL), Creativity and Innovation (CI) **CI 5.3:** Identification of requirements of a given situation and justification of more than one creative tool that will be suitable **CC 8.1:** Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group **CI 6.4:** Imagining and seeing things in a different way

STRAND 2: CYCLES

SUB-STRAND 2: LIFE CYCLE OF ORGANISMS

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B9/JHS3.2.2.1 Demonstrate an understanding of thelife cycle of grasshopperand assess how their activities affect humans	**B9/JHS3.2.2.1.1 Describe the life cycle of the grasshopper as a formof incomplete metamorphosis** **Exemplars:** 1. Draw the stages of the life cycle of a grasshopper from egg through nymph to adult. 2. Identify the behaviour of each stage of the life cycle of a grasshopper. 3. Explain why the life cycle of the grasshopper is described as incomplete metamorphosis as compared to complete metamorphosis in the housefly and mosquito in B7/JHS1.2.2.1.1 and B8/JHS2.2.2.1.1 respectively.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC) Digital Literacy (DL), Creativity and Innovation (CI) **CI 6.3:** Ability to select the most effective creative **tools** for work, and give reasons for the choice **DL 6.3:** Use digital tools to create novel things **CC 8.1:** Speak clearly and explain ideas. Share a narrative or **extended** answer while speaking to a group **CC 8.2:** Explain ideas in a clear order with relevant details, using correct construction and structure of speech **CP 9.2**: Understand and use interpersonal skills

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	B9/JHS3.2.2.1.2 Examine how the activities of the grasshopper affecthumans. **Exemplars:** 1. Outline the activities of the grasshopper in everyday life (e.g. feeding on grasses and weeds.). 2. Carry out a search for information on activities of the grasshopper that are harmful or beneficial to humans. 3. Generate activities to promote or reduce the effect of the activities of grasshoppers on humans.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital Literacy (DL) **CC 7.3:** Provide feedback in areas of ideas, organisation, voice, word choice and sentence fluency in communication **CC 8.2:** Explain ideas in a clear order with relevant details, using correct construction and structure of speech **DL 5.6:** Preparedness to make better decisions using available information **DL 6.6:** Knowledge and recognition of ethical use of information **CP 6.7:** Implement strategies with accuracy

STRAND 2: CYCLES

SUB-STRAND 3: CROP PRODUCTION

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B9/JHS3.2.3.1 Show an understanding of differences in maturities of different crops grown in different soils and different seed beds	**B9/JHS3.2.3.1.1 Observe and describe differences in maturation ofcrops grown in different soils and on different seed beds** **Exemplars:** 1. Observe and record the maturity stages of different crops grown in different soils and seed beds. 2. Discuss the differences in maturity stages among the different crops on the different soils and seed beds. 3. Compare and contrast the maturity stages of crops and seedlings in the community/school garden with others grown elsewhere.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital Literacy (DL) **DL 5.5:** Evaluate the quality and validity of information **CC 8.2:** Explain ideas in a clear order with relevant detail, using correct construction and structure of speech **CC 8.3:** Apply appropriate diction, and structure sentences correctly for narrative, persuasive, imaginative and expository purposes
B9/JHS3.2.3.2 Demonstrate knowledge and understanding of uses of different crops at different maturity stages	**B9/JHS3.2.3.2.1 Observe and record the uses of different crops atdifferent maturity stages.** **Exemplars:** 1. Discuss and write the uses of each maturity stage of each crop identified. 2. Categorise crops by their different maturity stages and uses.	**Communication and Collaboration (CC) Digital Literacy (DL),Critical Thinking and problem solving (CP)** **CC 8.2:** Explain ideas in a clear order with relevant details, using correct construction and structure of speech **DL 5.5:** Evaluate the quality and validity of information **CP 5.1:** Ability to combine information and ideas from several sources to reach a conclusion

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	B9/JHS3.2.3.2.2 Evaluate the importance of knowledge of maturitystages of different crops to human beings **Exemplars:** 1. Explain the specific use(s) of each maturity stage of different crops to humans, other crops, animals, and the environment. 2. Discuss the differences in maturity stages among the different crops on the different soil media and seed beds. 3. Compare and contrast the maturity stages of crops and seedlings in the community/school garden with others grown elsewhere.	Communication and Collaboration (CC) Digital Literacy (DL),Critical Thinking and problem solving (CP) **CC 7.3:** Provide feedback in areas of ideas, organisation, voice, word choice and sentence fluency in communication **CC 8.2:** Explain ideas in a clear order with relevant detail, using correct construction and structure of speech **CC 8.3:** Apply appropriate diction, and structure sentences correctly for narrative, persuasive, imaginative and expository purposes
B9/JHS3.2.3.2 Demonstrate knowledge and understanding of uses of different crops at different maturity stages	**B9/JHS3.2.3.2.1 Observe and record the uses of different crops atdifferent maturity stages** **Exemplars:** 1. Discuss and write the uses of each maturity stage of each crop identified. 2. Categorise crops by their different maturity stages and uses.	**Communication and Collaboration (CC) Digital Literacy (DL),Critical Thinking and problem solving (CP)** **CC 8.2:** Explain ideas in a clear order with relevant detail, using correct construction and structure of speech **DL 5.5:** Evaluate the quality and validity of information **CP 5.1:** Ability to combine information and ideas from several sources to reach a conclusion

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	B9/JHS3.2.3.2.2 Evaluate the importance of knowledge of thematurity stages of different crops to human beings **Exemplars:** 1. Explain the specific use(s) of each maturity stage of different crops to humans, other crops, animals, and the environment. 2. Explain how the knowledge of the maturity stages of different crops helps a farmer in crop selection, time of harvest, and others. 3. Compare different stages of maturity of crops identified in the community with those used in other places.	Communication and Collaboration (CC) Digital Literacy (DL),Critical Thinking and problem solving (CP) **CC 7.3:** Provide feedback in areas of ideas, organisation, voice, word choice and sentence fluency in communication **CP 5.3:** Create simple logic trees to think through problems **CP 6.4:** Ability to identify important and appropriate criteria and use them to evaluate alternatives **DL 5.3:** Ability to find and utilise digital content

STRAND 2: CYCLES

SUB-STRAND 4:ANIMAL PRODUCTION

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B9/JHS3.2.4.1 Demonstrate understanding of the preparation of feed for domestic and commercial animals	**B9/JHS3.2.4.1.1 List the ingredients and the method of preparationof different feed for different domestic and commercial animals** **Exemplars:** 1. Demonstrate how farmers prepare feed for different domestic and commercial animals with ingredients. 2. Write down the process of preparing feed for different domestic and commercial animals with the ingredients. 3. Compile a table, matching feed, ingredients and method of preparation. 4. Formulate and prepare feed for domestic and commercial animals.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital Literacy (DL), Personal development and leadership (PD) **CP 5.6:** Demonstrate a thorough understanding of a generalised concept and facts specific to task or situation **PL 6.2:** Division of tasks into solvable units and assigning group members to task units **DL 6.6:** Knowledge and recognition of ethical use of information **DL 6.6:** Knowledge and recognition of ethical use of information

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B9/JHS3.2.4.2 Demonstrate skills and knowledge offeeding domestic and commercial animals	**B9/JHS3.2.4.2.1 Describe and select appropriate feed for differentdomestic and commercial animals** **Exemplars:** 1. Compile a list of feed commonly consumed by the different domestic and commercial animals in the environment. 2. Compare and contrast the characteristics of different kinds of feed commonly consumed by categories of domestic and commercial animals (ruminants, monogastrics, and poultry). 3. Record feed used to feed domestic and commercial animals on farms over a period of time. 4. Identify named samples of feed for three categories of domestic and commercial animals (ruminants, monogastrics, and poultry).	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital Literacy (DL), Personal development and leadership (PD) **CC 8.2:** Explain ideas in a clear order with relevant detail, using correct construction and structure of speech **DL 5.3:** Ability to find and utilise digital content **CP 5.1:** Ability to combine information and ideas from several sources to reach a conclusion **PL 5.2:** Demonstrate a sense of belonging in a group

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	B9/JHS3.2.4.2.2 Differentiate between different types of feed for different stages of domestic and commercial animals. **Exemplars:** 1. Categorise different types of animals according to their stages of growth (young, growing and matured stages). 2. List the types of feed used for the various stages of growth in their domestic and commercial ruminants, monogastrics and poultry. 3. Compare and construct the major functions of feed in each growth stage of different animals. 4. Discuss types of feed used to feed different domestic and commercial animals at different stages of growth.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Personal development and leadership (PD) **CP 5.5:** Effectively evaluate the success of solutions used in an attempt to solve a complex problem **CC 9.2:** Understand and use interpersonal skills **PL 5.1:** Understanding oneself (strengths, weaknesses, goals and aspirations), in reacting and adjusting to novel situations **CC 9.4:** Help group work on relevant activities
	B9/JHS3.2.4.2.3 Perform the feeding of domestic and commercialanimals. **Exemplar:** 1. Demonstrate how to feed domestic and commercial animals at different stages of growth and production, with appropriate feed in the school farm or a farm in the community.	**Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC)** **CC 8.5:** Vary the level of detail and the language used when presenting to make it appropriate to the audience **CP 5.6:** Demonstrate a thorough understanding of a generalised concept and facts specific to task or situation

STRAND 3: SYSTEMS

SUB-STRAND 1:THE HUMAN BODY SYSTEM

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B9/JHS3.3.1.1 Demonstrate understanding of the blood circulatory system, health problems associated with the system and its relationship with the respiratory system in humans	**B9/JHS3.3.1.1.1 Explain the concept of the circulatory system, state the function of each part of the system and the healthchallenges associated with it** **Exemplars:** 1. Discuss the blood circulatory system in humans and the composition and functions of blood. 2. Explain the functions of the parts of the circulatory system. 3. Draw and label the longitudinal section of a mammalian heart. 4. Describe the prevention and causes of diseases of the circulatory system. 5. Describe what blood pressure is and ways of managing it.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC), Digital literacy (DL), Creativity and Innovation (CI) **CP 5.8:** Identify and prove misconceptions about a generalised concept or fact specific to a task or situation **CC 9.1:** Demonstrate behaviour and skills of working towards group goals **DL 6.3:** Use digital tools to create novel things **CI 6.2:** Ability to reflect on approaches to creative tasks and evaluate the effectiveness of tools used **CC 9.4:** Help group work on relevant activities
	B9/JHS3.3.1.1.2 Explain the concept of respiration and show how therespiratory and circulatory systems complement each other. (Note that respiration is a chemical reaction that releases carbon dioxide (CO_2), water (H_2O) and energy from glucose and oxygen). **Exemplars:** 1. Explain the concept of respiration. 2. Explain how deoxygenated blood from circulation is oxygenated through inhalation for respiration to take place	**Communication and Collaboration (CC), and** **Critical Thinking and Problem Solving (CP)** **CC 7.5:** Identify and analyse different points of views of speaker **CP5.3:** Create simple logic trees to think through problems

STRAND 3: SYSTEMS

SUB-STRAND 2:THE SOLAR SYSTEM

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B9/JHS3.3.2.1 Demonstrate knowledge of other non-planetary bodies such ascomets, asteroids, and their relationship with the solar system	**B9/JHS3.3.2.1.1 Understand the movement of non-planetary bodiesin the solar system** **Exemplars:** 1. Research for information on the movement of non-planetary bodies in the solar system. E.g. asteroids and comets. 2. Compare and contrast the movement of the non-planetary bodies in the solar system.	Communication and Collaboration (CC), Digital Literacy (DL) **DL 5.6:** Preparedness to make better decisions using available information **CC 8.2:** Explain ideas in a clear order with relevant details, using correct construction and structure of speech

STRAND 3: SYSTEMS

SUB-STRAND 3: ECOSYSTEM

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B9/JHS3.3.3.1 **Recognise the interdependenceof organisms in an ecosystem and appreciate their interaction to maintain balance in the system**	**B9/JHS3.3.3.1.1 Conduct research into the composition of an ecosystem and discuss how the components depend on each other for survival.** **Exemplars:** 1. Describe how organisms depend on each other in different ecosystems. (You may use pictures, charts and videos). 2. State the differences between an ecosystem and a habitat. 3. Construct a food chain and a food web found in an ecosystem. 4. Predict and justify your predictions on how interferences such as earthquake, volcanic eruptions, hunting, farming, mining, "galamsey,"pollution, pesticides and bush burning will affect the balance in an ecosystem.	Communication and Collaboration (CC), Digital Literacy (DL), Creativity and Innovation (CI) **DL 5.3:** Ability to find and utilise digital content **CC 9.3:** Understand roles during group activities **CI 5.2:** Ability to merge simple/complex ideas to create novel situations or things **CI 5.4:** Ability to visualise alternatives, see possibilities, and identify problems and challenges

STRAND 3: SYSTEMS

SUB-STRAND 4: FARMING SYSTEMS

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B9/JHS3.3.4.1 Demonstrate knowledge and skills in the preparation of different types of manure from animal and plant waste	**B9/JHS3.3.4.1.1 List and explain the different plant and animal wasteused in preparing different types of manure** **Exemplars:** 1. List some types of manure used by farmers. 2. Identify and write down the materials used in preparing manure and their sources . 3. Categorise manure into those from plant wastes and animal wastes. 4. Compile a list of plant parts/wastes and animal parts/wastes that are used to prepare manure. 5. Justify the use of different animal and plant manures (poultry droppings, cow dung, animal parts and carcases, pig dung, human excreta, domestic refuse, leaves, waste fruits, plant parts and shavings, etc) under different soil and climatic conditions.	Communication and Collaboration (CC), Creativity and Innovation (CI), Critical Thinking and Problem Solving (CP) **CC 9.1:** Demonstrate behaviour and skills of working towards group goals **CP 5.3:** Create simple logic trees to think through problems **CI 6.5:** Anticipate and overcome difficulties relating to taking initiatives **CC 7.3:** Provide feedback in areas of ideas, organisation, voice, word choice and sentence fluency in communication **CP 5.6:** Demonstrate a thorough understanding of a generalised concept and facts specific to a task or situation

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	B9/JHS3.3.4.1.2 Demonstrate the preparation of different types ofmanure **Exemplars:** 1. Prepare manure from the different plant and animal wastes. 2. Discuss the preparation of manure using the plants and animal wastes that are available in a community.	Communication and Collaboration (CC), Creativity and Innovation (CI),Critical Thinking and Problem Solving (CP) **CP 6.3:** Ability to select alternative(s) that adequately meet selected criteria **CC 8.5:** Vary the level of detail and the language used when presenting to make it appropriate to the audience
	B9/JHS3.3.4.1.3 Prepare different types of manure. **Exemplars:** 1. Treat various plant and animal wastes to generate manure (cleaning/ sorting, curing/composting) in the field or school garden.	Communication and Collaboration (CC), Critical Thinking and Problem Solving (CP) **CC 9.1:** Demonstrate behaviour and skills of working towards group goals **CP 6.7:** Implement strategies with accuracy

STRAND 4: FORCES AND ENERGY

SUB-STRAND 1: ENERGY

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B9/JHS3.4.1.1 Show understanding of the concept of conservation of energy and ways of conserving energy	**B9/JHS3.4.1.1 .1 List the ways to conserve energy. Examples: ironingin bulk, using energy efficient appliances and switching off appliances when not in use.** **Exemplar:** 1. Identify and discuss various strategies of conserving energy.	Creativity and Innovation (CI), Communication and Collaboration (CC) **CI 5.3:** Identification of requirements of a given situation and justification of more than one creative tool that will be suitable **CC 8.1:** Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group
	B9/JHS3.4.1.1.2 Explain the importance of energy conservation indaily life. **Exemplar:** 1. Research information about energy conservation and discuss its importance to life.	Digital Literacy (DL) **DL 5.3:** Ability to find and utilise digital content
B9/JHS3.4.1.2 Demonstrate understanding in and the capability to do calculations involving energy.	**B9/JHS3.4.1.2.1 Explain how to calculate energy consumed over aperiod of time** **Exemplar:** 1. Calculate electrical energy consumed by the use of electrical appliances in Kilowatt-hour (kWh). P = IV, where P is power, I is current, V is voltage.	Critical Thinking and Problem Solving (CP) Creativity and Innovation (CI) **CP 6.1: Ability** to effectively define goals towards solving a problem

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	B9/JHS3.4.1.2.2 Describe how images are formed in cameras. **Exemplar:** 1. Create a model of a camera and describe how it works to form an image.	Creativity and Innovation (CI) **CI 6.3:** Ability to select the most effective creative tools for work and give reasons for the choice
	B9/JHS3.4.1.2.3 Describe the formation of shadows.Exemplar: 1. Discuss the terms umbra and penumbra in relation to the formation of shadows and explain how they are formed.	Communication and Collaboration (CC) **CC 8.1:** Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group
	B9/JHS3.4.1.2.4 Demonstrate the formation of an eclipse. **Exemplar:** 1. Use a model to illustrate how an eclipse is formed,	Creativity and Innovation (CI), Digital Literacy (DL) **CI:** Ability to merge simple ideas to create novel thing; look at alternatives in creating new things **DL 5.3:** Ability to find and utilise digital content
B9/JHS3.4.1.3 Evaluate the application of light energy in life.	**B9/JHS3.4.1.3.1 Demonstrate that light changes path when it travelsfrom one medium to a different medium.** **Exemplar:** 1. Carry out a practical activity to show that light bends as it travels from one medium to another. E.g. A rod appears bent in water; deep water appears shallow than its real depth.	Creativity and Innovation (CI) Digital Literacy (DL) **CI 6.1:** Exhibit the skill of inquisitiveness and curiosity **DL 5.3:** Ability to find and utilise digital content;

STRAND 4: FORCES AND ENERGY

SUB-STRAND 2: ELECTRICITY AND ELECTRONICS

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B9/JHS3.4.2.1 Construct electrical circuits and illustrate how electricalenergy is transformed into other forms of energy and perform electrical calculations	**B9/JHS3.4.2.1.1 Demonstrate transformation of electrical energy toother forms of energy in both series and parallel circuits and perform simple calculations involving the flow of current in circuits.** **Exemplars:** 1. Predict the impact of changes in electrical circuits with regards to the output of bulbs. Describe how electrical energy transformation occurs in series and parallel circuits. 2. Construct simple electrical circuits and measure the voltage, current and resistance. 3. Calculate the potential difference in a circuit using the formula: V = IR (where I is the current and R the resistance).	Communication and Collaboration (CC), Critical Thinking and Problem Solving (CP) **CC 8.1:** Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group by an audience **CP 5.5:** Effectively evaluate the success of solutions used in an attempt to solve a complex problem **CP 6.5:** Ability to select alternative(s) that adequately meets selected criteria
B9/JHS3.4.2.2 Demonstrate an understanding of Forward and Reverse Bias and explain the behaviour of LEDs, Diodes, Resistors and Capacitors in electronic circuits	**B9/JHS3.4.2.2.1 Describe forward bias and reverse bias and explainthe relationship among the components, such as: LEDs, Diodes, Resistors and Capacitors, in an electronic circuit.** **Exemplars:** 1. Explain forward bias and reverse bias in an electronic circuit. 2. Construct different electronic circuits (the forward and reverse bias), and observe what happens to the LED. 3. Construct different electronic circuits involving resistors and capacitors and observe what happens to the LED and report on their	Communication and Collaboration (CC), Creativity and Innovation (CI) **CC 8.2:** Explain ideas in a clear order with relevant detail, using correct construction and structure of speech **CI 5.1:** Examine alternatives in creating new things **CI 5.1:** Examine alternatives in creating new things

STRAND 4: FORCES AND ENERGY

SUB-STRAND 3: CONVERSION AND CONSERVATION OF ENERGY

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B9/JHS3.4.3.1 Show an understanding of conversion and conservation of energy and their application to life	**B9/JHS3.4.3.1.1 Describe how energy can be converted from one form to another and show how conservation of energy occurs.** **Exemplar:** 1. Differentiate between conversion of energy and conservation of energy and show their application to life.	Communication and Collaboration (CC) **CC 7.5:** Identify and analyse different points of views of speaker
	B9/JHS3. 4.3.1.2 Describe how conversion and conservation ofenergy are applied in life. **Exemplars:** 1. Distinguish between energy conversion and conservation using everyday examples. 2. Identify opportunities to conserve energy and produce a report of your work.	Communication and Collaboration (CC) **CC 7.5:** Identify and analyse different points of views of speaker **CC 7.5:** Identify and analyse different points of views of **speaker**

STRAND 4: FORCES AND ENERGY

SUB-STRAND 4: FORCE AND MOTION

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B9/JHS3.4.4.1 Demonstrate understanding of the concept of pressure and explain how pressure acts in everyday life	**B9/JHS3.4.4.1.1 Explain the concept of pressure and show how pressure relates to force; perform activities that work on the principle of pressure in the daily lives of humans.** **Exemplars:** 1. Demonstrate the action of pressure through a number of activities such as using drinking straw, pumping car tyres, filling of balloons, water jets at washing bays, etc. to understand the concept of pressure. 2. Describe the relationship between pressure and force and discuss the application of pressure in everyday life.	Critical Thinking and Problem Solving (CP) **CI 5.1: Examine** alternatives in creating new things **CC 8.1:** Speak **clearly** and explain ideas. Share a narrative or extended answer while speaking to a group **CI 5.1:** Examine alternatives in creating new things
B9/JHS3.4.4.2 Demonstratean understanding of Newton's Third Law of Motion and its application in everyday life	**B9/JHS3.4.4.2.1 Explain the importance of Newton's Third Law ofMotion in life.** **Exemplars:** 1. State Newton's Third Law of Motion. 2. Discuss Newton's Third Law of Motion and show its importance to life.	Communication and Collaboration (CC) **CC 8.3:** Apply appropriate diction, and structure sentences correctly for narrative, persuasive, imaginative and expository purposes **CC 8.2:** Explain ideas in a clear order with relevant detail, using correct construction and structure of speech, using appropriate conjunctions to structure and speech.

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	B9/JHS3.4.4.1.2 Demonstrate the application of Newton's Third Lawof motion in life. **Exemplars:** 1. Predict what happens when: a) a force is exerted on an object. b) There is a reaction from the object c) the force exerted is the same as the reaction of the object. 2. Perform an activity to justify your predictions.	Creativity and Innovation (CI) **CI 6.1:** Exhibit strong memory, intuitive thinking, and respond appropriately **CP 5.4:** Generate hypotheses to help answer complex problems
B9/JHS3.4.4.2 Demonstrate understanding of Newton's Laws of motion and ability to apply the laws to solve problems in everyday life	**B9/JHS3.4.4.2.1 Explain Newton's Laws of Motion and theirapplications to daily life.** **Exemplars:** 1. Explain Newton's Laws of Motion and relate them to momentum. 2. Demonstrate the application of Newton's Laws of motion in everyday life. 3. Derive the formula, $f = ma$, where f is the force, m the mass of the object, and a, the acceleration, from Newton's three Laws of Motion and use the formula to calculate the force that a moving mass of body exerts when moving with known acceleration.	Critical Thinking and Problem Solving (CP), Creativity and Innovation (CI) **CP 5.2:** Analyse and make distinct judgement about viewpoints expressed in an argument **CI 5.1:** Examine alternatives in creating new things **CI 5.2:** Ability to merge simple/complex ideas to create novel situations or things

STRAND 4: FORCES AND ENERGY

SUB-STRAND 5: AGRICULTURAL TOOLS

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B9/JHS3.4.5.1 Demonstrate knowledge and skills in making simple agricultural tools for on-farm activities	**B9/JHS3.4.5.1.1 Identify materials used in making simple agriculturaltools.** **Exemplars:** 1. Describe simple agricultural tools assembled from their environment. 2. Identify the materials used to make the tools assembled in exemplar 1 and show how the parts are connected.	Creativity and Innovation (CI), Communication and Collaboration (CC), Critical Thinking and Problem Solving (CP) **CI 5.7:** Putting forward constructive comments, ideas, explanation and new ways of doing things. **CI 5.3:** Identification of requirements of a given situation and justification of more than one creative tool **CP 5.1:** Ability to combine Information and ideas from several sources to reach a conclusion
	B9/JHS3.4.5.1.2 Discuss and write activities involved in makingsimple agricultural tools. **Exemplars:** 1. Describe the activities and processes involved in making different agricultural tools. 2. Explain the materials, processes, constraints and precautions involved in manufacturing simple agricultural tools.	Communication and Collaboration (CC) **CC 8.1:** Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group **CC 8.2:** Explain ideas in a clear order with relevant detail, using correct construction and structure of speech
	B9/JHS3.4.5.1.3 Manufacture simple agricultural tools. **Exemplar:** 1. Produce simple farm tools using materials from the environment.	Creativity and Innovation (CI) **CI 5.2:** Ability to merge simple/complex ideas to create novel situations or things

STRAND 5: HUMANS AND THE ENVIRONMENT

SUB-STRAND 1: WASTE MANAGEMENT

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B9/JHS3.5.1.1 Demonstrate an understanding of the scientific ways of waste management	**B9/JHS3. 5.1.1.1 Investigate the scientific methods used in wastemanagement.** **Exemplars:** 1. Identify scientific methods such as recycling, composting used in waste management. 2. Explain the scientific principles underlying the methods used in waste management. 3. Conduct an audit of waste management methods in schools andassess the effectiveness of each.	Communication and Collaboration (CC), Creativity and Innovation (CI),Critical Thinking and Problem Solving (CP) **CC 8.2:** Explain ideas in a clear order with relevant details, using correct construction and structure of speech **CP 5.3:** Create simple logic trees to think through problems **CI 5.4:** Ability to visualise alternatives, see possibilities, and identify problems and challenges
B9/JHS3.5.1.2. Demonstrate an understanding of the impact of waste on an environment, innovative waste management technologies for sustainable development and waste management practices in Ghana	**B9/JHS3.5.1.2.1 Describe innovative ways of waste management forsustainable development.** **Exemplars:** 1. Explain the impact of waste produced on the environment. 2. Identify innovative ways to manage waste for sustainable development. 3. Describe the types of waste produced within communities in Ghana. 4. Examine and critique the waste management practices in Ghana identifying positives and negatives and opportunities for improvement.	Critical Thinking and Problem Solving (CP), Creativity and Innovation (CI) **CP 5.2:** Analyse and make distinct judgment about **viewpoints** expressed in an argument **CP 6.3:** Ability to select alternative(s) that adequately meet selected criteria **CI 6.8:** Recognise and generalise information and experience; search for trends and patterns **CP 6.3:** Ability to select alternative(s) that adequately meet selected criteria

STRAND 5: HUMANS AND THE ENVIRONMENT

SUB-STRAND 2: HUMAN HEALTH

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B9/JHS3.5.2.1 Demonstrate knowledge of common non-communicable diseases of humans, their causes, symptoms, effects and prevention	**B9/JHS3.5.2.1.1 Explain the symptoms, effects and prevention of some non-communicable diseases and analyse the risk factorsassociated with them.** **Exemplars:** 1. Describe what non-communicable diseases are and determine their common causes. 2. Identify symptoms, effects and prevention of non-communicable diseases (refer to teachers pack for specific diseases) that are associated with malnutrition, poor working environment and exposure to drugs. 3. Explain the causes, symptoms, effects and prevention of cancer. 4. Identify common cancers that affect humans and link them to life style.	Communication and Collaboration (CC), Critical Thinking and Problem Solving (CP), Digital Literacy (DL), Cultural Identity and Global citizenship (CG) **CC 8.2:** Explain ideas in a clear order with relevant detail, using structure and speech **CP 5.1:** Ability to combine information and ideas from several sources to reach a conclusion **DL 5.5:** Evaluate the quality and validity of information **CG 5.5:** Adjust to the demands of customs, traditions, values and attitudes of society

B9/JHS3.5.2.2 Demonstrate understanding of the relationship of health and disease, the concept of common diseases in the environment and how to control them	**B9/JHS3.5.2.2.1 Explain the concepts of health and disease and showtheir relationship.** **Exemplar:** 1. Define health as stipulated by World Health Organisation (WHO) and show the relationship between health and disease.	Critical Thinking and Problem Solving (CP), Creativity and Innovation (CI) **CI 6.1:** Exhibit strong memory, intuitive thinking; and respond appropriately
	B9/JHS3.5.2.2.2 Explain the concept of common diseases in an environment. **Exemplars:** 1. Conduct a survey about common diseases and analyse the findings to show what constitutes a common disease in a community. 2. Identify causes, symptoms and prevention of common diseases.	Critical Thinking and Problem Solving (CP), **CP 6.3:** Identify important and appropriate alternatives **CP 6.3:** Ability to select alternative(s) that adequately meet selected criteria

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B9/JHS3.5.2.2 Demonstrate knowledge of selected fungal, diseases of humans, their causes, symptoms, effects and prevention	**B9/JHS3.5.2.2.1 Explain the nature of fungal diseases with special emphasis on Ringworm/candidiasis/fingernail, and toe nail infection, their causes, symptoms, effects on humans and its prevention** **Exemplars:**	Communication and Collaboration (CC), Critical Thinking and Problem Solving (CP), Digital Literacy (DL), Cultural Identity and Global citizenship (CG)
	1. Discuss the nature of fungal diseases.	**CP 5.1:** Ability to combine information and ideas from several sources to reach a conclusion
	2. Search for information and make presentations on ringworm, candidiasis and fungal eye infection diseases their mode of transmission from person to person, community to community and from country to country.	**DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem
	3. Describe the symptoms, effects and prevention of ringworm, candidiasis and fungal eye infection diseases.	**CC 8.1:** Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group
	4. Describe the role of individuals, community members and government in managing ringworm, candidiasis and fungal eye infection diseases.	**CC 8.1:** Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group
	5. Design and produce a poster to educate their community members on the incidence and control of named fungal diseases: ringworm, candidiasis and fungal eye infection	**CI 5.2:** Ability to merge simple/complex ideas to create novel situations or thing

STRAND 5: HUMANS AND THE ENVIRONMENT

SUB-STRAND 3: SCIENCE AND INDUSTRY

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B9/JHS3.5.3.1 Analyse the scientific concepts, principles and processes applied in industries in and outside their community	**B9/JHS3.5.3.1.1 Investigate the scientific concepts, principles and processes involved in industries in their environment.**	Communication and Collaboration (CC), Critical Thinking and Problem Solving (CP), Digital Literacy (DL),
	Exemplars: 1. Identify products of industries within and outside their community and describe the process of production.	**CC 9.1:** Demonstrate behaviour and skills of working towards group goals **CP 5.8:** Identify and prove misconceptions about a generalised concept or fact specific to a task or situation
	2. Investigate and outline scientific concepts, principles and processes underlying the production of common everyday industrial products.	**DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem
B9/JHS3.5.3.2 Demonstrate an understanding of the concept of industry, the science underpinning the processes of production in industries the technologies in indigenous industries and western industries	**B9/JHS3.5.3.2.1 Explain the concept of industry and distinguish between modern and indigenous industries.** **Exemplars:** 1. Identify an industry as individual firms producing the same commodity and give examples of industries in their community.	Critical Thinking and Problem Solving (CP), Creativity and Innovation (CI) **CP 5.1:** Ability to combine Information and ideas from several sources to reach a conclusion
	2. Describe how technology affects industry and compare the technologies in indigenous and modern industries.	**CI 6.8:** Recognise and generalise information and Demonstrate a thorough understanding of a generalised concept and facts specific to task or situation experience search for trends and patterns

	B9/JHS3.5.3.2.2 Examine indigenous industries in their communitiesand show the scientific processes in the stages of production. **Exemplars:** 1. Discuss indigenous industries in their communities and identify the scientific processes, concepts and principles underlying the stages of production in the industries. 2. Identify indigenous practices at home, school and the community and the science involved in the practices.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC) **CC 9.1:** Demonstrate behaviour and skills of working towards group goals **CP 6.4:** Ability to identify important and appropriate criteria and use them to evaluate alternatives **CP 6.3:** Ability to select alternative(s) that adequately meet selected criteria

STRAND 5: HUMANS AND THE ENVIRONMENT

SUB-STRAND 4: CLIMATE CHANGE AND GREEN ECONOMY

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B9/JHS3.5.4.1 Demonstrate an understanding of the natural and human factors that influence climate change and a green economy	**B9/JHS3.5.4.1.1 Examine various natural and human factors that influence climate change and green economy in their localities.** **Exemplars**: 1. Identify the natural factors that influence climate change. 2. Describe ways of minimising human activities that influence climate change. 3. Compare natural and human factors that influence climate change and green economy.	Communication and Collaboration (CC), Creativity and Innovation (CI), Digital Literacy (DL), **DL 6.4:** Adhere to behavioural protocols that prevail in cyberspace **CC 7.5:** Identify and analyse different points of views of speaker **CI 6.3:** Ability to select the most effective creative tools for work and give reasons for the choice
B9/JHS3.5.4.2 Evaluate the effectiveness of initiatives that address the issue of climate change and green economy in Ghana and the world at large	**B9/JHS3.5.4.2.1 Assess data on climate change and green economy actions/ activities globally including Ghana and other countries.** **Exemplars:** 1. Research into climate change and green economy actions in Ghana. 2. Access climate change and green economy actions in other countries. 3. Compare and contrast climate change and green economy actions in Ghana and other countries. 4. Identify and write the effective initiatives that address climate change and green economy issues in Ghana and other countries.	Critical Thinking and Problem Solving (CP), Digital Literacy (DL) **CP 6.3:** Identify important and appropriate alternatives **DL 5.1:** Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem **CP 6.4:** Ability to identify important and appropriate **criteria** and use them to evaluate alternatives **CP 6.3:** Ability to select alternative(s) that adequately meet **selected** criteria **CP 5.1:** Ability to combine information

	5. Prescribe with reasons best practices to serve as possible solutions to address climate change and green economy issues in Ghana.	and ideas from several **sources** to reach a conclusion

STRAND 5: HUMANS AND THE ENVIRONMENT

SUB-STRAND 5: UNDERSTANDING THE ENVIRONMENT

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
B9/JHS3.5.5.1 Demonstrate knowledge and skills in the use of plant roots, stems, leaves, flowers, and fruits for agriculturaland non-agricultural purposes	**B9/JHS3.5.5.1.1 Show and list the uses of different plant parts for agricultural and non-agricultural purposes.** **Exemplars** 1. Identify plant parts that are used for agricultural and non-agricultural purposes. 2. Describe how plant parts are used for agricultural and non-agricultural purposes. 3. List the uses of plant parts for agricultural purposes (such as planting, tools, animal housing, animal feed, soil improvement, pest and disease control, etc.). 4. List the uses of plant parts for non-agricultural purposes (such as herbal medicine, construction of houses, bridges and furniture, artefacts, ceremonies, rituals, education, etc.).	Communication and Collaboration (CC), Creativity and Innovation (CI), Digital Literacy (DL), Critical Thinking and Problem Solving (CP) **CC 7.3:** Provide feedback in areas of ideas, organisation, voice, word choice and sentence fluency in communication **CP 5.5:** Effectively evaluate the success of solutions used in an attempt to solve a complex problem **CI 5.3:** Identification of requirements of a given situation and justification of more than one creative tool that will be suitable **DL 5.5:** Evaluate the quality and validity of information

CONTENT STANDARD	INDICATORS AND EXEMPLARS	CORE COMPETENCIES
	B9/JHS3.5.5.1.2 Demonstrate the use of different plant parts for agricultural and non-agricultural purposes. **Exemplars:** 1. Create agricultural materials from different plant parts that are used to carry out agricultural activities. 2. Create non-agricultural materials from different plant parts to carry out non-agricultural activities.	Communication and Collaboration (CC), Digital Literacy (DL), Critical Thinking and Problem Solving (CP), Creativity and Innovation (CI) **CC 9.1:** Demonstrate behaviour and skills of working towards group goals **CP 5.6:** Demonstrate a thorough understanding of a generalised concept and facts specific to a task or situation **CI 5.3:** Identification of requirements of a given situation and justification of more than one creative tool that will be suitable

APPENDICES

APPENDIX 1: CORE COMPETENCIES AND SUBSKILLS OF THE COMMON CORE PROGRAMME (CCP)

1. COMMUNICATION AND COLLABORATION (CC)

B7/JHS1-B9/JHS3		
CC7: LISTENING	**CC8: PRESENTING**	**CC9: TEAMWORK**
CC7.1: Identify words or sentences in context appropriately	**CC8.1**: Speak clearly and explain ideas. Share a narrative or extended answer while speaking to a group	**CC9.1**: Demonstrate behaviour and skills of working towards group goals
CC7.2: Interpret correctly and respond to non-verbal communication such as facial expressions, cues and gestures	**CC8.2**: Explain ideas in a clear order with relevant details, using correct construction and structure of speech	**CC9.2**: Understand and use interpersonal skills
CC7.3: Provide feedback in areas of ideas, organisation, voice, word choice and sentence fluency in communication	**CC8.3**: Apply appropriate diction, and structure sentences correctly for narrative, persuasive, imaginative and expository purposes	**CC9.3**: Understand roles during group activities
CC7.4: Identify underlying themes, implications and issues when listening	**CC8.4**: Anticipate different responses from the audience and plan for them	**CC9.4**: Help group work on relevant activities
CC7.5: Identify and analyse different points of views of speaker	**CC8.5**: Vary the level of detail and the language used when presenting to make it appropriate to the audience	**CC9.5**: Appreciate the importance of including all team members in discussions and actively encourage contributions from them
		CC9.6: Ability to work with all group members to complete a task successfully
		CC9.7: Effectively perform multiple roles within the group
		CC9.8: Demonstrate an awareness of the wider team dynamics and work to minimise conflicts in the team

2. CRITICAL THINKING AND PROBLEM SOLVING (CP)

B7/JHS1-B9/JHS3	
CP5: CRITICAL THINKING	**CP6: PROBLEM SOLVING**
CP 5.1: Ability to combine information and ideas from several sources to reach a conclusion	**CP 6.1:** Ability to effectively define goals towards solving a problem
CP 5.2: Analyse and make distinct judgement about viewpoints expressed in an argument	**CP 6.2:** Ability to explain plans for attaining goals
CP 5.3: Create simple logic trees to think through problems	**CP 6.3:** Identify important and appropriate alternatives
CP 5.4: Generate hypotheses to help answer complex problems	**CP 6.4:** Ability to identify important and appropriate criteria and use them to evaluate available alternatives
CP 5.5: Effectively evaluate the success of solutions used in an attempt to solve a complex problem	**CP 6.5:** Ability to select alternative(s) that adequately meet selected criteria
CP 5.6: Demonstrate a thorough understanding of a generalised concept and facts specific to task or situation	**CP 6.6:** Preparedness to recognise and explain results after implementation of plans
CP 5.7: Provide new insight into controversial situation or task	**CP 6.7:** Implement strategies with accuracy
CP 5.8: Identify and prove misconceptions about a generalised concept or fact specific to a task or situation	
CP 5.9: Identify and explain a confusion, uncertainty, or a contradiction surrounding an event	
CP 5.10: Develop and defend a logical plausible resolution to a confusion, uncertainty or contradiction surrounding an event	

3. PERSONAL DEVELOPMENT AND LEADERSHIP (PL)

B7/JHS1-B9/JHS3	
PL5: PERSONAL DEVELOPMENT	**PL6: LEADERSHIP**
PL5.1: Understanding oneself (strengths, weaknesses, goals and aspirations),in reacting and adjusting to novel situations	**PL6.1:** Ability to serve group members effectively
PL5.2: Demonstrate a sense of belongingness to a group	**PL6.2:** Division of tasks into solvable units and assigning group members to task units
PL5.3: Recognise one's emotional state and their preparedness to apply emotional intelligence	**PL6.3:** Ability to manage time effectively
PL5.4: Ability to understand one's personality traits	**PL6.4:** Ability to manage and resolve conflicts
PL5.5: Desire to accept one's true self and overcome weaknesses	**PL6.5:** Ability to monitor team members to ascertain progress
PL5.6: Ability to set and maintain personal standards and values	**PL6.6:** Ability to mentor peers
	PL6.7: Actively promote effective group interaction and the expression of ideas and opinions in a way that is sensitive to the feelings and background of others
	PL6.8: Actively assist group identify changes or modifications necessary in the group activities and work towards carrying out those changes

4. CULTURAL IDENTITY AND GLOBAL CITIZENSHIP (CG)

B7/JHS1-B9/JHS3	
CG5: CULTURAL IDENTITY	**CG6: GLOBAL CITIZENSHIP**
CG5.1: Show a strong sense of belongingness to one's culture	**CG6.1:** Understanding of influences of globalisation on traditions, languages and cultures
CG5.2: Develop and exhibit ability to defend one's cultural beliefs, practices and norms	**CG6.2:** Recognise resistance to global practices that are inimical to our culture
CG5.3: Develop and express respect, recognition and appreciation of others' cultures	**CG6.3:** Know the global discourse about the roles of males and females
CG5.4: Develop and exhibit a sense of cultural identity	**CG6.4:** Exhibit a sense of nationality and global identity
CG5.5: Adjust to the demands of customs, traditions, values and attitudes of society	

5. CREATIVITY AND INNOVATION (CI)

B7/JHS1-B9/JHS3	
CI5: KNOWLEDGE, UNDERSTANDING, SKILLS AND STRATEGIES	**CI6: REFLECTION AND EVALUATION**
CI 5.1: Examine alternatives in creating new things	**CI 6.1:** Exhibit strong memory, intuitive thinking, and respond appropriately
CI 5.2: Ability to merge simple/complex ideas to create novel situations or things	**CI 6.2:** Ability to reflect on approaches to creative tasks and evaluate the effectiveness of tools used
CI 5.3: Identification of requirements of a given situation and justification of more than one creative tool that will be suitable	**CI 6.3:** Ability to select the most effective creative tools for work, and give reasons for the choice
CI 5.4: Ability to visualise alternatives, see possibilities, and identify problems and challenges	**CI 6.4:** Imagining and seeing things in a different way
CI 5.5: Ability to try new alternatives and different approaches	**CI 6.5:** Anticipate and overcome difficulties relating to taking initiatives
CI 5.6: Understand and use analogies and metaphors	**CI 6.6:** Being open-minded, adapting and modifying ideas to achieve creative results
CI 5.7: Putting forward constructive comments, ideas, explanations and new ways of doing things	**CI 6.7:** Look and think about things differently and from different perspectives
	CI 6.8: Recognise and generalise information and experience; search for trends and patterns
	CI 6.9: Interpret and apply learning in new contexts
	CI 6.10: Reflect on work and explore the thinking behind thoughts and processes

6. DIGITAL LITERACY (DL)

B7/JHS1-B9/JHS3	
DL5: PHOTO-VISUAL AND INFORMATION LITERACY	**DL6: SOCIO-EMOTIONAL AND REPRODUCTION LITERACY**
DL5.1: Ability to ascertain when information is needed and be able to identify, locate, evaluate and effectively use it to solve a problem	**DL 6.1:** Understand the sociological and emotional aspects of cyberspace
DL5.2: Ability to recognise and avoid traps in cyberspace	**DL 6.2:** Create a meaningful and original piece of work, or its interpretation by integrating existing information
DL5.3: Ability to find and utilise digital content	**DL6.3:** Use digital tools to create novel things
DL5.4: Ability to construct knowledge from a non-linear hyper-textual navigation	**DL6.4:** Adhere to behavioural protocols that prevail in cyberspace
DL5.5: Evaluate the quality and validity of information	**DL6.5:** Recognition of societal issues emanating from the use of digital technologies
DL5.6: Preparedness to make better decisions using available information	**DL6.6:** Knowledge and recognition of ethical use of information

Please note these inclusivity issues

The core competencies outlined in this document must be assessed taking into consideration learners with special needs (physical disabilities, learning disabilities, etc.). Consider the use of realia for visual and visually challenged learners.

A system of creating alternatives for tasks must also be adopted.

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