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KENYA INSTITUTE OF CURRICULUM DEVELOPMENT
A skilled and Ethical Society

PRIMARY SCHOOL EDUCATION CURRICULUM DESIGN

SCIENCE & TECHNOLOGY

GRADE 6

First Published 2017

Revised 2024

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FOREWORD

The Government of Kenya (GoK) is committed to ensuring that policy objectives for Education, Training and Research meet the aspirations of the Constitution of Kenya 2010, the Kenya Vision 2030, National Curriculum Policy 2018, the United Nations Sustainable Development Goals (SDGs) and the regional and global conventions to which Kenya is a signatory. Towards achieving the mission of Basic Education, the Ministry of Education (MoE) has successfully and progressively rolled out the implementation of the Competency Based Curriculum (CBC) at Pre-Primary, Primary and Junior School levels.

The Kenya Institute of Curriculum Development (KICD) reviewed the curriculum and rationalised the number of learning areas in 2024. The review and rationalisation process was informed by several factors, among them, the recommendations of the Presidential Working Party on Education Reforms (PWPER) and reports of the continuous curriculum monitoring and evaluation activities.

The reviewed curriculum designs build on competencies attained earlier by learners. The designs prepare the learner for smooth transition to the next level. The designs will also afford the learner opportunities for developing requisite competencies and enable them to interact with other people and the environment around them.

The key components of the curriculum designs include the National Goals of Education, the essence statement, general and specific learning outcomes as well as the strands and sub strands. Suggested learning experiences, key inquiry questions, core competencies, Pertinent and Contemporary Issues (PCIs), values and assessment rubrics are also outlined in the curriculum designs.

It is expected that all Government agencies and other stakeholders in Education will use the designs to plan for the effective and efficient implementation of the Competency Based Curriculum.

Thank you.



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PREFACE

The Ministry of Education (MoE) rolled out the Competency Based Curriculum (CBC), nationally in 2019, following a national convention in 2017 where the *Basic Education Curriculum Framework (BECF)* was adopted by stakeholders and a national pilot of the curriculum in the Early Years of Education (EYE) in 2018. According to the UNESCO IBE requirements, a curriculum should be reviewed every five years. So, the review of CBC was due from 2023. In view of this, the reviewed curriculum designs will enhance the implementation of CBC since it corporates the lessons learnt from the implementation of CBC so far.

Consistent periodical review of the curriculum is also critical in the realisation of the Vision and Mission of the on-going curriculum reforms as enshrined in the Sessional Paper No. I of 2019 whose title is: *Towards Realizing Quality, Relevant and Inclusive Education and Training for Sustainable Development* in Kenya. The Sessional Paper explains the shift from a content-focused curriculum to a focus on producing an engaged, empowered and ethical citizen.

Therefore, the reviewed curriculum designs will facilitate the inculcation of core competencies in CBC, which are identified as: communication and collaboration, critical thinking and problem solving, creativity and imagination, citizenship, digital literacy, learning to learn and self-efficacy.

The curriculum designs provide suggestions for interactive and differentiated learning experiences linked to the various strands and sub strands and other aspects of the CBC. The designs also outline suggested learning resources and varied assessment techniques. It is expected that the use of these designs will lead to enhanced learning outcomes at various levels, prepare the learner for smooth transition to subsequent grades and make learning enjoyable.

The MoE requests all stakeholders to keep giving feedback on the curriculum designs to inform the review during the next cycle.

Thank you.



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ACKNOWLEDGEMENT

The Kenya Institute of Curriculum Development (KICD) Act Number 4 of 2013 (Revised 2019) mandates the Institute to develop and review curricula and curriculum support materials for basic and tertiary education and training. The curriculum development process is guided by research, international best practices as well as stakeholder engagement. The Institute conceptualised the Competency Based Curriculum (CBC) in consultation with the Ministry of Education and other stakeholders. According to the *Basic Education Curriculum Framework* (KICD, 2017) the conceptualisation of CBC was informed by 21st Century learning needs, the Constitution of Kenya 2010, the Kenya Vision 2030, the East African Community Protocol, the International Bureau of Education (IBE) Guidelines and the United Nations Sustainable Development Goals (SDGs).

KICD is funded by the Kenya Government to discharge its mandate. The institute also receives support from development partners targeting specific programmes. The reviewed curriculum designs were developed with the support of the World Bank through the Kenya Primary Education Equity in Learning Programme (KPEELP) - a project coordinated by MoE. KICD wishes to most sincerely thank the Government of Kenya, through the MoE and other development partners. More specifically, KICD appreciates the Cabinet Secretary - MoE and the Principal Secretary – State Department of Basic Education,

Additionally, the Institute expresses gratitude to all the KICD staff members, teachers, university lecturers, MoE staff, Semi-Autonomous Government Agencies (SAGAs) and representatives of various stakeholders; among others, for their contributions to the development of the reviewed curriculum designs. Finally, KICD acknowledges the Chief Executive Officers of the Teachers Service Commission (TSC) and the Kenya National Examinations Council (KNEC) as well as the KICD Council for supporting the curriculum review process.

May God bless all the individuals and respective institutions who in one way or another supported the curriculum review process. Indeed, these designs will effectively guide the implementation of the CBC at Primary level, thereby preparing the learner to transition to the Junior School.

Best wishes to all learners and curriculum implementers.



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NATIONAL GOALS OF EDUCATION

1. Foster nationalism, patriotism, and promote national unity

Kenya's people belong to different communities, races and religions and should be able to live and interact as one people. Education should enable the learner acquire a sense of nationhood and patriotism. It should also promote peace and mutual respect for harmonious co-existence.

2. Promote social, economic, technological and industrial needs for national development

Education should prepare the learner to play an effective and productive role in the nation.

a) Social Needs

Education should instil social and adaptive skills in the learner for effective participation in community and national development.

b) Economic Needs

Education should prepare a learner with requisite competences that support a modern and independent growing economy. This should translate into high standards of living for every individual.

c) Technological and Industrial Needs

Education should provide the learner with necessary competences for technological and industrial development in tandem with changing global trends.

3. Promote individual development and self-fulfilment

Education should provide opportunities for the learner to develop to the fullest potential. This includes development of one's interests, talents and character for positive contribution to the society.

4. Promote sound moral and religious values

Education should promote acquisition of national values as enshrined in the Constitution. It should be geared towards developing a self-disciplined and ethical citizen with sound moral and religious values.

5. Promote social equity and responsibility

Education should promote social equity and responsibility. It should provide inclusive and equitable access to quality and differentiated education; including learners with special educational needs and disabilities. Education should also provide the learner with opportunities for shared responsibility and accountability through service learning.

6. Promote respect for and development of Kenya's rich and varied cultures

Education should instil in the learner appreciation of Kenya's rich and diverse cultural heritage. The learner should value own and respect other people's culture as well as embrace positive cultural practices in a dynamic society.

7. Promote international consciousness and foster positive attitudes towards other nations

Kenya is part of the interdependent network of diverse peoples and nations. Education should therefore enable the learner to respect, appreciate and participate in the opportunities within the international community. Education should also facilitate the learner to operate within the international community with full knowledge of the obligations, responsibilities, rights and benefits that this membership entails.

8. Good health and environmental protection

Education should inculcate in the learner the value of physical and psychological well-being for self and others. It should promote environmental preservation and conservation, including animal welfare for sustainable development.

LESSON ALLOCATION AT UPPER PRIMARY

S/No	Learning Area	Number of Lessons per Week
1.	English	5
2.	Kiswahili / Kenya Sign Language	4
3.	Mathematics	5
4.	Religious Education	3
5.	Science & Technology	4
6.	Agriculture	4
7.	Social Studies	3
8.	Creative Arts	6
	Pastoral/Religious Instruction Programme	1
Total		35

LEVEL LEARNING OUTCOMES FOR PRIMARY SCHOOL EDUCATION

By the end of the Primary Education, the learner should be able to:

- a) Use verbal and or non-verbal cues to convey information in varied contexts.
- b) Demonstrate mastery of number concepts to solve problems in day to day life.
- c) Use appropriate social skills, moral and religious values to positively impact the society.
- d) Develop individual talents and interests for self-efficacy.
- e) Make informed decisions as local and global citizens of a diverse, democratic society in an interdependent world.
- f) Devise innovative strategies for environmental conservation and sustainability.
- g) Apply digital literacy skills for learning and enjoyment.
- h) Appreciate Kenya's rich and diverse cultural heritage for harmonious living.

ESSENCE STATEMENT

Science and Technology is a learning area which engages in the human pursuit to understand the relationships between the living and non-living universe. Science is a discipline that deals with explanations and predictions about nature and the universe while Technology is the application of science to create devices that can solve problems and do tasks.

The achievement of Vision 2030 greatly depends on Science, Technology and Innovation. Sessional Paper No.1 of 2005 highlights the fact that for a breakthrough towards industrialisation, achievement of the desired economic growth targets and social development, a high priority needs to be placed on the development of human capital through education and training by promoting the teaching of sciences and information technology. This is also highlighted in the Sessional Paper 14, 2012 which stresses the need for sustainable basic and higher education, with an emphasis on Science, Technology and Innovation (ST&I). This makes it necessary for Science and Technology to be taught in Upper Primary Education level.

This learning area builds on the competencies introduced at the lower primary under the learning area of Environmental Activities and equips the learner with pre-requisite skills which are required in Integrated Science and Pre-technical and Pre-

career studies at the lower secondary level. These enable learners to prepare for Science, Technology, Engineering and Mathematics (STEM) in subsequent levels of the education cycle. Inquiry based learning (IBL), Project based learning (PBL), Problem based learning (PBL) and Social Scientific Issue learning (SSI) approaches will be employed throughout the learning experiences in this area as advocated for by John Dewey's social constructivist theory which emphasises the learner should be given an opportunity to learn through hands-on activities. Engineering design shall be used as a pedagogical strategy to bridge science concepts with other learning areas to solve simple open-ended problems, develop creative thinking and analytical skills among learners, make decisions, and consider alternative solutions to address a variety of situations.

SUBJECT GENERAL LEARNING OUTCOMES

By the end of the upper primary, the learner should be able to:

- a) interact with the environment for learning and sustainable development.
- b) apply digital literacy skills appropriately for communication, learning and enjoyment.
- c) appreciate the contribution of science and technology in the provision of innovative solutions.
- d) use scientific knowledge to observe and explain the natural world.
- e) make functional discoveries that impact individuals and the wider society.
- f) use innovative approaches as well as critical thinking and problem solving skills to stimulate scientific inquiry, at the local, national and global levels for lifelong learning.

SUMMARY OF STRANDS AND SUB STRANDS

Strands	Sub Strands	Suggested Number of Lessons
1.0 Living things and their Environment	1.1. Fungi	12
	1.2. Invertebrates	14
	1.3. Human circulatory system	16
2.0. Matter	2.1. Change of state	18
	2.2. Composition of air	16
3.0. Force and energy	3.1. Light	16
	3.2. Levers as simple machines	14
	3.3. Slopes as simple machines	14
	Total Number of Lessons	120
NOTE: The suggested number of lessons per Sub Strand may be less or more depending on the context.		

STRAND 1.0 LIVING THINGS AND THEIR ENVIRONMENT

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
1.0 Living Things and their Environment	1.1 Fungi (12 lessons) <ul style="list-style-type: none"> ● Common fungi (<i>mushrooms, toadstool, puff balls, yeast and moulds</i>). ● Importance of fungi (<i>food, fermentation, health and medicine</i>). <p>Note: scientific names and details on application of fungi in food processing not required</p>	By the end of the sub-strand the learner should be able to: <ol style="list-style-type: none"> a) identify common fungi in the environment, a) describe the importance of fungi in nature, b) appreciate the importance of fungi in the economy. 	The learner is guided to: <ul style="list-style-type: none"> ● use print and non-print materials to search for images of common fungi such and share findings with peers, ● take a walk in the school compound and the adjacent environment to observe and identify different types of fungi, ● grow moulds on available food materials, observe and share with peers, ● use print and non-print materials to search for information on the economic importance of moulds, yeast and mushrooms, record and discuss with peers. <p>Note: <i>Learners are guided to observe precautions and safe disposal of wastes when handling fungi.</i></p>	How is fungi important in nature?
<p>Core Competencies to be developed: Learning to learn: The learner learns new information as they share with peers their findings on images of common fungi and the economic importance of moulds, yeast and mushrooms. Self-efficacy: The learner successfully grows moulds on food materials, observes and shares the findings with peers.</p>				

Values:

Responsibility: The learner plays different role(s) as they grow moulds on available food materials, observe and share with peers.

Pertinent and Contemporary Issues

Financial Literacy: The learner learns about economic activities as they use print and non-print materials to search for information on the economic importance of moulds, yeast and mushrooms.

Environmental conservation: The learner learns how to conserve the environment as they observe precautions and safe disposal of wastes when handling fungi.

Links to Other Learning Areas:

Agriculture and Nutrition: The learner is able to link information on the economic importance of fungi to food production in Agriculture and Nutrition.

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
1.0 Living Things and their Environment	1.2 Invertebrates (14 lessons) <ul style="list-style-type: none"> ● Common invertebrates: (<i>insects; spiders, ticks and mites; millipedes and centipedes; snails and slugs; worms; Sea invertebrates - octopus, starfish and crabs</i>). ● Importance of invertebrates (<i>food, pollination, soil aeration, pests, transmission of diseases</i>). ● Note: scientific names not required. 	By the end of the sub-strand the learner should be able to: <ol style="list-style-type: none"> a) identify common invertebrates in the environment, b) practise precautions in handling invertebrates, c) describe the general characteristics of invertebrates, d) outline the economic importance of invertebrates, e) appreciate the importance of invertebrates in nature. 	The learner is guided to: <ul style="list-style-type: none"> ● walk around the school compound, observe and identify common invertebrates, record and share with peers, ● use print and non-print material to search for information on common invertebrates and share the findings with peers, ● discuss with peers the safety precautions applied when handling invertebrates, ● use print and non-print materials to search for information on general characteristics of invertebrates, ● explore the school compound and the adjacent environment to identify different invertebrates and their characteristics; practise safety precautions in handling invertebrates, 	What are the common features of invertebrates?

			<ul style="list-style-type: none"> • make an inventory of common invertebrates in their locality, • discuss the economic importance of invertebrates. 	
<p>Core Competencies to be developed:</p> <p>Critical thinking and problem solving: The learner identifies solutions to some economic problems as they discuss the economic importance of invertebrates.</p> <p>Creativity and Imagination: The learner thinks critically, imagines and innovatively creates an inventory of common invertebrates in their locality.</p>				
<p>Values:</p> <p>Love: The learner learns how to take care self and others as they explore the school compound and their locality to identify different invertebrates and their characteristics.</p>				
<p>Pertinent and Contemporary Issues:</p> <p>Animal Welfare: The learner learns how to take care of animals as they explore the school compound and their locality to identify different invertebrates and their characteristics.</p> <p>Safety and security: The learner practises and observes safety precautions in handling animals as they discuss safety precautions applied when handling invertebrates.</p> <p>Health promotion issues: The learner discusses the role of invertebrates in transmission of diseases as they discuss safety precautions applied when handling invertebrates.</p>				
<p>Links to Other Learning Areas:</p> <p>Agriculture and Nutrition: The learner is able to link information on transmission of diseases to communicable diseases in Agriculture and Nutrition.</p>				

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
1.0 Living Things and the Environment	1.3 Human circulatory system (16 lessons) <ul style="list-style-type: none"> ● Parts of the human circulatory system (<i>heart, blood vessels and blood</i>). Note: details of different blood vessels and parts of the body not needed. <ul style="list-style-type: none"> ● Parts of the heart and their functions. ● Major blood vessels and their functions. ● Components of blood and their functions. ● Symptoms and prevention of common health conditions of the 	By the end of the sub-strand the learner should be able to: <ol style="list-style-type: none"> a) identify main parts of the human circulatory system, b) describe functions of main parts of the human circulatory system, c) outline the symptoms and prevention of common health conditions of the human circulatory 	The learner is guided to: <ul style="list-style-type: none"> ● use print and non-print materials to search for information on the main parts of the human circulatory system and share the finding with peers, ● use locally available materials to model the human circulatory system and share the finding with peers, ● use online interactive platforms or digital images or writing materials to illustrate main parts of the human circulatory system, ● use print and non-print material to search for information on parts of the heart (<i>auricles, ventricles and vessels</i>) and their functions, record and share their findings with peers, ● discuss with peers the functions of the main blood vessels in the human body (<i>arteries, veins and</i> 	<ol style="list-style-type: none"> 1. What is the human circulatory system made up of? 2. What measures enhance a healthy human circulatory system?

	<p>human circulatory system (<i>hardening of arteries, high blood pressure and heart attack</i>).</p>	<p>system, d) develop a routine plan for maintaining a healthy circulatory system, e) appreciate the importance of a healthy circulatory system.</p>	<p><i>capillaries</i>),</p> <ul style="list-style-type: none"> ● discuss with peers the components of blood and their functions, record and share (<i>red blood cells, white blood cells and platelets</i>) ● search for information on the symptoms and prevention of common health conditions of the human circulatory system and share the findings with peers, ● discuss with peers the ways of maintaining a healthy human circulatory system, ● discuss with peers on routine plan for maintaining a healthy circulatory system, and develop a routine plan for maintaining a healthy circulatory system (<i>to include drinking plenty of water, physical activities and healthy eating</i>). 	
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Core Competencies to be developed:

Communication and Collaboration: The learner acquires listening and speaking skills as they discuss components of blood and their functions.

Digital literacy: The learner uses interactive platforms or digital images as they search for information on the main parts of the human circulatory system and share the finding with peers.

Values:

Responsibility: The learner learns how to live responsibly while practising ways for maintaining a healthy circulatory system.

Unity: The learner shares the roles involved in an activity as they use print and non-print material to search for information on parts of the heart.

Pertinent and Contemporary Issues (PCI's):

Health promotion issues: The learner learns ways of living healthy as they discuss ways of maintaining a healthy human circulatory system and develop a routine plan for maintaining a healthy circulatory system.

Links to other learning areas:

Creative Arts: The learner is able to relate modelling of the human circulatory system to modelling in Creative Arts and Sports.

Suggested Assessment Rubric

Level Indicators	Exceeds Expectations	Meets Expectations	Approaches Expectations	Below Expectations
Ability to describe the importance of fungi.	The learner describes the importance of fungi correctly and comprehensively.	The learner describes the importance of fungi correctly.	The learner describes the importance of fungi partially.	The learner has challenges describing the importance of fungi , with prompt.
Ability to practise precautions in handling invertebrates.	The learner practises precautions in handling invertebrates consistently.	The learner practises precautions in handling invertebrates.	The learner sometimes practises precautions in handling invertebrates.	The learner has challenges practising precautions in handling invertebrates.
Ability to outline the economic importance of invertebrates.	The learner outlines the economic importance of invertebrates correctly, giving example(s) from the locality.	The learner outlines the economic importance of invertebrates correctly.	The learner outlines most of the economic importance of invertebrates correctly with help	The learner outlines a few economic importance of invertebrates.
Ability to describe functions of main parts of the human circulatory system.	The learner describes functions of main parts of the human circulatory system correctly and comprehensively.	The learner describes functions of main parts of the human circulatory system correctly	The learner describes most of the functions of main parts of the human circulatory system correctly.	The learner describes a few functions of main parts of the human circulatory system.
Ability to develop a routine plan for maintaining a healthy circulatory system.	The learner develops a comprehensive routine plan for maintaining a healthy circulatory system.	The learner develops a routine plan for maintaining a healthy circulatory system.	The learner develops a routine plan for maintaining a healthy circulatory system omitting some parts.	The learner develops a routine plan for maintaining a healthy circulatory system.

STRAND 2.0 MATTER

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
2.0 Matter	2.1 Change of State (18 lessons) <ul style="list-style-type: none"> ● Changes of state of matter. (<i>melting, evaporation, sublimation, deposition, condensation and freezing</i>). ● Application of change of state of matter. 	By the end of the sub-strand the learner should be able to: <ol style="list-style-type: none"> a) identify the changes of state when substances are heated or cooled, b) describe the applications of the change of state of matter in everyday life, c) appreciate the applications of change of state of matter in day-to-day life. 	<p>The learner is guided to:</p> <ul style="list-style-type: none"> ● brainstorm the meaning of change of state of matter, ● carry out activities to demonstrate change of state of matter, ● discuss the applications of change of state of matter in everyday life, ● use digital or print media to search for information on what happens when matter is heated or cooled. <p>Note: <i>observe safety while heating substances to avoid fires and burns.</i></p> <p>Project: Learners to make candles using waste candle wax or beeswax. Learners to repair broken plastic containers.</p>	How is change of state of matter important in day-to-day life?

Core Competencies to be developed:

Communication and collaboration: The learner acquires speaking and listening skills as they brainstorm the meaning of change of state of matter.

Learning to learn: The learner learns the best procedural practices of changing states as they carry out activities to demonstrate change of state of matter.

Values:

Respect: The learner appreciates diverse opinions of others while discussing the change of state of matter in everyday life.

Pertinent and contemporary Issues:

Socio-economic issues (Environmental Education): The learner practises ways of conserving the environment as they make candles using waste candle wax or beeswax and repairing broken plastic containers to save on the cost.

Linkage to Other Learning Areas:

Agriculture and Nutrition: The learner relates the concept of evaporation as a process of drying clothes and cereals in Agriculture and Nutrition.

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
2.0 Matter	2.2 Composition of Air (16 lessons) <ul style="list-style-type: none"> ● Composition of air in the atmosphere. ● Uses of different components of air ● Air pollution. 	By the end of the sub-strand, the learner should be able to: <ol style="list-style-type: none"> a) identify the components of air, b) outline uses of the different components of air, c) explain the effects of air pollution in the environment, d) describe methods of reducing air pollution in the environment, e) appreciate the need for clean air in day-to-day life. 	The learner is guided to: brainstorm on the meaning air and its constituent, <ul style="list-style-type: none"> ● draw a pie chart showing percentage composition of components of air, ● carry out activity to investigate the presence of oxygen in air collaboratively (<i>use a burning candle</i>), ● discuss with peers the uses of the different components of air, ● brainstorm on the meaning of air pollution, ● explore the school and neighbourhood to identify air pollutants, ● discuss with peers the effects of air pollution on the environment, ● identify and discuss methods of reducing air pollution, ● use digital or print media to search for more information on the effects of air pollution. Note: <i>observe safety precautions in air-</i>	How does air pollution affect the environment?

			<p><i>polluted environments (Example: practise use of dust masks, goggles, overcoats).</i></p> <p>Project: Learners are guided to make posters on common air pollutants, dangers of air pollution and ways of controlling air pollution.</p>	
<p>Core Competencies to be developed:</p> <p>Citizenship: The learner relates concept of environmental conservation as they discuss on air pollutants and come up with ways of reducing air pollution in the environment.</p> <p>Learning to learn: The learner learns new skills of controlling air pollutants as they explore the school and neighbourhood to identify air pollutants.</p>				
<p>Values:</p> <p>Responsibility: The learner observes safety precautions in an air-polluted environment as they identify and discuss methods of reducing air pollution.</p> <p>Patriotism: The learner serves the community by making posters on common air pollutants, dangers of air pollution and ways of controlling air pollution to educate members of the community.</p>				
<p>Pertinent and Contemporary Issues:</p> <p>Socio-economic and environmental issues (Environmental education and climate change): The learner practises ways of environmental conservation as they identify and discuss methods of reducing air pollution.</p>				
<p>Link to Other Learning Areas:</p> <p>Mathematics: The learner uses mathematical skills to draw a pie chart showing the percentage composition of components of air.</p>				

Suggested Assessment Rubric

Level Indicator	Exceeds Expectations	Meets Expectations	Approaches Expectations	Below Expectations
Ability to identify the changes of state when substances are heated or cooled.	The learner correctly identifies the changes of state when substances are heated or cooled giving examples from locality.	The learner correctly identifies at least four changes of state when substances are heated or cooled.	The learner identifies at least two changes of state when substances are heated or cooled.	The learner identifies less than two changes of state when substances are heated or cooled.
Ability to identify the components of air.	The learner correctly identifies the major components of air giving some examples.	The learner identifies the major components of air correctly.	The learner identifies most of the major components of air correctly.	The learner correctly identifies a few of the major component of air.
Ability to explain the effects of air pollution on the environment.	The learner correctly and comprehensively explains the effects of air pollution on the environment.	The learner correctly explains the effects of air pollution on the environment.	The learner explains most of the effects of air pollution on the environment correctly.	The learner explains a few effects of air pollution on the environment.

STRAND 3.0 FORCE AND ENERGY

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
3.0 Force and Energy	3.1 Light (16 lessons) <ul style="list-style-type: none"> ● Movement of light through materials (<i>transparent, translucent and opaque</i>). ● Ray diagrams of images in plane mirrors. ● Formation of shadows and eclipses (<i>solar & lunar eclipses</i>). ● Reflection of light at plane surfaces. ● Image formation in plane mirrors. ● Rainbow formation. 	By the end of the sub-strand, the learner should be able to: <ol style="list-style-type: none"> a) demonstrate the movement of light through materials, b) draw ray diagrams of images formed in plane mirrors, c) illustrate the formation of shadows and eclipses in nature, d) describe the formation of rainbow in nature, e) appreciate the importance of movement light in everyday life. 	The learner is guided to: <ul style="list-style-type: none"> ● carry out activities to show the movement of light through different materials, ● perform an experiment to show reflection of light in plane mirrors (<i>laws of reflection</i>), ● locate and illustrate images formed in plane mirrors and discuss their characteristics, ● carry out activities to demonstrate and illustrate the formation of shadows and eclipses, ● use digital or print media to search for more information on the movement of light through materials, image formation in plane mirrors, the formation of shadows, eclipses and rainbow in nature, ● discuss with peers the applications of movement of light through different media (<i>mirrors,</i> 	How does light travel?

			<p><i>periscope, kaleidoscope, lenses, magnifying glass, hand lens, mirage, rainbow).</i></p> <p>Project: Learner uses locally available resources to make a functional periscope.</p>	
<p>Core Competencies to be developed:</p> <p>Digital literacy: The learner interacts with digital technology as they use digital or print media to search for information on the movement of light through materials, image formation in plane mirrors, the formation of shadows, eclipses and rainbows in nature.</p> <p>Communication and Collaboration: The learner cooperates and works harmoniously with peers as they discuss the applications of movement of light in different media.</p>				
<p>Values:</p> <p>Unity: The learner works harmoniously with peers as they use locally available resources to make a functional periscope.</p>				
<p>Pertinent and Contemporary Issues:</p> <p>Socio-economic issues: The learner observes safety and security as they use plane mirrors to perform experiments to demonstrate image formation and describe the characteristics of images formed.</p>				
<p>Links to Other Learning Areas:</p> <p>The learner is able to relate the concept of ray of light in lighting up the home in Home Science.</p>				

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
3.0 Force and Energy	3.2 Levers as simple machines (14 lessons) <ul style="list-style-type: none"> ● Examples of levers. ● Parts of levers (<i>fulcrum/pivot, effort, and load</i>). ● Classification of levers (<i>first, second and third class levers</i>). ● Uses of levers in day-to-day life (<i>a hole punch, pliers, scissors, a seesaw, wheelbarrow, bottle openers, nail clippers, a nutcracker, shovel, fishing rod, kitchen tongs and tweezers</i>). 	By the end of the sub-strand, the learner should be able to: <ol style="list-style-type: none"> a) identify common levers used in day-to-day life, b) describe parts of a lever as used in making work easier, c) classify levers into the three classes, d) demonstrate the use of levers in making work easier, e) appreciate the use of levers in making work easier. 	The learner is guided to: <ul style="list-style-type: none"> ● brainstorm on the meaning of levers as simple machines, ● work collaboratively to identify parts of a lever, ● carry out activities to group levers into the three classes, ● carry out activities to demonstrate the use of common levers as simple machines, ● use digital or print media to search for information on how levers make work easier in day-to-day life. <p>Project: Learners are guided to make and use a beam balance from locally available materials.</p>	How are levers used in day to day life?

Core Competencies to be developed

Creativity and imagination: The learner assembles different parts and innovatively makes a beam balance from locally available materials.

Learning to learn: The learner learns from each other as they carry out activities while demonstrating the use of common levers as simple machines.

Values:

Respect: The learner displays positive regard for self and others as they work together to identify parts of a lever.

Pertinent and Contemporary Issues:

Citizenship education: The learner exercises care and protection for one another while performing experiments to demonstrate the use of common levers as simple machines.

Link to Other Learning Areas:

Agriculture and Nutrition: Learner is able to link application of the principle of levers in farm tools, use of cutlery; spoons and bottle openers as in Agriculture and Nutrition.

Creative Arts: Learner is able to apply the concepts of simple leavers as they play on a see-saw in Creative Arts.

Strand	Sub-Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
3.0 Force and Energy	3.3 Slopes as simple machines (14 lessons) <ul style="list-style-type: none"> ● Types of slopes. ● Uses of slopes. 	By the end of the sub-strand, the learner should be able to: <ol style="list-style-type: none"> a) identify types of slopes used as simple machines, b) demonstrate how a slope makes work easier in day-to-day life, c) appreciate the use of slopes in everyday life. 	The learner is guided to: <ul style="list-style-type: none"> ● discuss with peers the meaning of slope as a simple machine (<i>inclined plane</i>), ● give practical examples on where slopes are used to make work easier around the school environment (<i>ladders, ramps, staircase, road winding uphill, wedge, roofs, loading a lorry</i>), ● discuss with peers how slopes are used to make work easier in day-to-day life, ● carry out activities to show how slopes make work easier, ● where possible, use digital media to search for information on how slopes make work easier (<i>elevators/lifts, escalators/moving stairs, stair case, ladders, cableways, ramps, road winding uphill, wedge, roofs, loading a lorry</i>), ● discuss with peers the importance of use of slopes in day-to-day life. 	How are slopes used in everyday life?

			Project: make a simple slope for use in school or at home using locally available materials.	
Core Competencies to be developed:				
Citizenship: The learner exercises ethical responsibility as they make a simple slope for use in school or at home using locally available materials.				
Critical thinking and problem solving: The learner thinks clearly as they make a simple slope for use in school or at home using locally available materials.				
Values:				
Integrity: The learner learns how to utilise resources prudently while making a simple slope for use in school or at home.				
Pertinent and Contemporary Issues:				
Socio economic issues: The learner exercises safety and security as they carry out activities to show how slopes make work easier.				
Links to Other Learning Areas:				
Agriculture and Nutrition: The learner is able to relate the concept of slope in the use of farm tools, equipment and machinery to carry out the projects in Agriculture and Nutrition.				

Suggested Assessment Rubric

Indicator \ Level	Exceeds Expectations	Meets Expectations	Approaches Expectations	Below Expectations
Ability to illustrate the formation of shadows and eclipses in nature.	The learner illustrates the formation of shadows and eclipses in nature correctly and labels.	The learner illustrates the formation of shadows and eclipses in nature correctly.	The learner illustrates the formation of shadows and eclipses in nature omitting some basic details.	The learner illustrates the formation of shadows and eclipses in nature, with help.
Ability to demonstrate the use of levers to make work easier.	The learner demonstrates the use of levers to make work easier correctly and innovatively.	The learner demonstrates the use of levers to make work easier correctly.	The learner partially demonstrates the use of levers to make work easier correctly	The learner demonstrates the use of levers to make work easier, with prompt.
Ability to demonstrate how a slope makes work easier in day-to-day life.	The learner demonstrates how a slope makes work easier in day-to-day life correctly and innovatively, giving illustrations.	The learner demonstrates how a slope makes work easier in day-to-day life correctly.	The learner partially demonstrates how a slope makes work easier in day-to-day life correctly.	The learner requires prompt to demonstrate how a slope makes work easier in day-to-day life.

APPENDIX I: CSL AT UPPER PRIMARY (GRADE 4-6)

At this level, the goal of the CSL activity is to provide linkages between concepts learnt in the various learning activities and the real-life experiences. Learners begin to make connections between what they learn and the relevance to their daily life. CSL is hosted in the Social Studies learning area. The implementation is a collaborative effort where the class teacher coordinates and works with other subject teachers to design and implement the integrated CSL activity. Though they are teacher-guided, the learners should progressively be given more autonomy to identify problems and come up with solutions. The safety of the learners should also be taken into account when selecting the CSL activity. The following steps for the integrated CSL activity should be staggered across the school terms:

Steps in carrying out the integrated CSL activity

1) Preparation

- Map out the targeted core competencies, values and specific learning area skills for the CSL activity
- Identify resources required for the activity (locally available materials)
- Stagger the activities across the term (set dates and time for the activities)
- Communicate to learners, parents/caregivers/guardians, school administration, teachers and other relevant stakeholders in the school community
- Identify and develop assessment tools

2) Implementation of CSL Activity

- Assigning roles to learners.
- Ensure every learner actively participates in the activity
- Observe learners as they carry out the CSL activity and record feedback
- Use an appropriate assessment tool to assess both the process and the product (assess learner's work from the beginning to the end product)
- Assess the targeted core competencies, values and subject skills.

3) Reflection on the CSL Activity

Conduct a self-evaluation session with learners on the integrated CSL activity undertaken by discussing the following:

- what went well and why
- what did not go well and why,
- what can be done differently next time
- what they have learnt.

There will be **one** integrated CSL activity that will be conducted **annually**. The thematic areas for the integrated CSL activity will be derived from the broader categories of the PCIs and concepts from the various learning areas. Teachers are expected to vary the themes yearly to allow learners to address different PCIs within their contexts. There should be a linkage between the skills from the learning areas and the themes.

The integrated CSL activity will take a Whole School Approach (WSA) where the entire school community is involved (learners, parents/caregivers/guardians, school administration, teachers). Parents/caregivers/guardians are key stakeholders in the planning and execution of the CSL activity. Although the teacher takes the lead role in the planning and integration of the CSL activity, learners will be expected to participate actively in the whole process.

The CSL activity provides an opportunity for the development of core competencies and the nurturing of various values. The teacher is expected to vary the core competencies and values emphasised in the activity yearly.

Assessment of the CSL Activity

Assessment of the integrated CSL activity will focus on 3 components namely: skills from various learning areas applied in carrying out the activity, and core competencies and values demonstrated. Assessment should focus on both the process and end product of the CSL activity. The teacher will assess learners using various tools such as an observation schedule, checklist or rating scale or any other appropriate tool.

APPENDIX II : LIST OF ASSESSMENT METHODS, LEARNING RESOURCES AND NON-FORMAL ACTIVITIES

Suggested Assessment Methods in Science	Suggested Learning Resources	Suggested Non-Formal Activities
<ul style="list-style-type: none"> ● Reflections ● Game playing ● Pre-post testing ● Model making ● Explorations ● Experiments ● Investigations ● Conventions, conferences and debates ● Applications ● Teacher observations ● Project ● Journals ● Portfolio ● Oral or aural questions ● Learner’s profile ● Written tests ● Anecdotal records 	<ul style="list-style-type: none"> ● Laboratory apparatus and equipment ● Textbooks ● Software ● Relevant reading materials ● Digital devices ● Recordings 	<ul style="list-style-type: none"> ● Visit the science historical sites. ● Use digital devices to conduct scientific research. ● Organise walks to have live learning experiences. ● Develop simple guidelines on how to identify and solve some community problems. ● Conduct science document analysis. ● Participate in talks by resource persons on science concepts. ● Participate in science clubs and societies ● Attend and participate in science and engineering fairs ● Organise and participate in exchange programmes. ● Make oral presentations and demonstrations on science issues.