



**REPUBLIC OF KENYA
MINISTRY OF EDUCATION**

UPPER PRIMARY CURRICULUM DESIGN

SCIENCE AND TECHNOLOGY

GRADE 5

FOR LEARNERS WITH VISUAL IMPAIRMENT



KENYA INSTITUTE OF CURRICULUM DEVELOPMENT
A Skilled and Ethical Society

First Published 2017

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FOREWORD

The Government of Kenya 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 2019, 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 implementation of Competency Based Curriculum involves monitoring and evaluation to determine its success. After the five-year implementation cycle, a summative evaluation of the primary education cycle was undertaken to establish the achievement of learning outcomes as envisaged in the Basic Education Curriculum Framework. The Government of Kenya constituted a Presidential working Party on Education Reforms (PWPER) in 2022 to address salient issues affecting the education sector. PWPER made far reaching recommendations for basic education that necessitated curriculum review. The recommendations of the PWPER, monitoring reports, summative evaluation, feedback from curriculum implementers and other stakeholders led to rationalisation and review of the basic education curriculum.

The reviewed Grade Five Curriculum designs for learners with visual impairment build on competencies attained by learners at Grade Four. Emphasis at this grade is the development of basic literacy, numeracy and skills for interaction with the environment.

The curriculum designs present National Goals of Education, essence statements, general and specific expected learning outcomes for the subjects as well as strands and sub strands. The designs also outline suggested learning experiences, key inquiry questions, core competencies, Pertinent and Contemporary Issues (PCIs), values, and assessment rubric.

It is my hope that all Government agencies and other stakeholders in Education will use the designs to plan for effective and efficient implementation of the CBC.

HON. EZEKIEL OMBAKI MACHOGU, CBS
CABINET SECRETARY,
MINISTRY OF EDUCATION

PREFACE

The Ministry of Education (MoE) nationally implemented Competency Based Curriculum (CBC) in 2019. Grade one is the first grade of Primary education level while Grade Six is the final grade of the level in the reformed education structure.

The reviewed Grade Five Curriculum furthers implementation of the CBC from Grade Four in Primary level. The curriculum provides opportunities for learners to focus in a field of their choice to form a foundation for further education and training and/or gain employable skills. This is very 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 nurturing every learner's potential.

Therefore, the Grade Five Curriculum designs for learners with visual impairment are intended to enhance the learners' development in the CBC core competencies, namely: 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 sub strands and the other aspects of the CBC. They also offer several suggested learning resources and a variety of assessment techniques. It is expected that the designs will guide teachers to effectively facilitate learners to attain the expected learning outcomes for Grade Five and prepare them for smooth transition to Grade Six. Furthermore, it is my hope that teachers will use the adapted designs to make learning interesting, exciting and enjoyable.

**DR. BELIO KIPSANG', CBS
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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 (*SNE adapt*) curricula and curriculum support materials for basic and tertiary education and training. The curriculum development process for any level of education involves thorough research, international benchmarking and robust stakeholder engagement. Through a systematic and consultative process, the KICD conceptualised the Competency Based Curriculum (CBC) as captured in the Basic Education Curriculum Framework (BECF) 2017, that responds to the demands of the 21st Century and the aspirations captured in the Constitution of Kenya 2010, the Kenya Vision 2030, East African Community Protocol, International Bureau of Education Guidelines and the United Nations Sustainable Development Goals (SDGs).

KICD receives its funding from the Government of Kenya to facilitate successful achievement of the stipulated mandate and implementation of the Government and Sector (Ministry of Education (MoE) plans. The Institute also receives support from development partners targeting specific programmes. The revised Grade Five curriculum designs for learners with visual impairment were developed and adapted with the support of the World Bank through the Kenya Primary Education Equity in Learning Programme (KPEELP); a project coordinated by MoE. Therefore, the Institute is very grateful for the support of the Government of Kenya, through the MoE and the development partners for policy, resource and logistical support. Specifically, special thanks to the Cabinet Secretary-MoE and the Principal Secretary – State Department of Basic Education,

I also wish to acknowledge the KICD curriculum developers and other staff, all teachers, educators who took part as panellists; the Semi-Autonomous Government Agencies (SAGAs) and representatives of various stakeholders for their roles in the development and adaptation of the Grade Five Curriculum designs for learners with visual impairment. In relation to this, I acknowledge the support of the Chief Executive Officers of the Teachers Service Commission (TSC) and the Kenya National Examinations Council (KNEC) for their support in the process of developing and adapting these designs. Finally, I am very grateful to the KICD Council Chairperson and other members of the Council for very consistent guidance in the process.

I assure all teachers, parents and other stakeholders that this curriculum design will effectively guide the implementation of the CBC at Grade Five and preparation of learners with visual impairment for transition to Grade Six.

A handwritten signature in blue ink, appearing to read 'Charles O. Ong'ondo', with a horizontal line underneath the name.

PROF. CHARLES O. ONG'ONDO, PhD, MBS
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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 FOR UPPER

S/ No.	Learning Area	No. of Lessons
1.	English for Learners with Visual Impairment	5
2.	Kiswahili for Learners with Visual Impairment	4
3.	Mathematics for Learners with Visual Impairment	5
4.	Religious Education	3
5.	Science & Technology for Learners with Visual Impairment	4
6.	Agriculture & Nutrition for Learners with Visual Impairment	4
7.	Social Studies for Learners with Visual Impairment	3
8.	Creative Arts for Learners with Visual Impairment	6
9.	Pastoral/ Religious Instruction Programme	1
	Total	35

NOTE: Braille skills for learners with Blindness to be implemented as Non formal (Co-Curricular) Programmes.

GENERAL LEARNING OUTCOMES FOR PRIMARY EDUCATION

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

- a) Communicate appropriately using verbal and or non-verbal modes in a variety of contexts.
- b) Apply acquired knowledge, skills, values and attitudes in everyday life.
- c) Demonstrate social skills, moral and religious values for positive contribution to society.
- d) Exploit one's talents for individual development and self-fulfilment.
- e) Explore, manipulate, manage and conserve the environment for learning and sustainable development.
- f) Use digital literacy skills for learning and enjoyment.
- g) Value Kenya's rich and diverse cultural heritage for harmonious living.
- h) Appreciate the need for, and importance of interdependence of people and nations.

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 things in the 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 learnt 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 visual impairment with pre- requisite skills which are required in Integrated Science and Pre-technical and Pre-career studies at the Junior School level. These enable learners with visual impairment to prepare for Science, Technology, Engineering and Mathematics (STEM) in subsequent levels of 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 with visual impairment to make decisions and consider alternative solutions to address a variety of situations.

SUBJECT GENERAL LEARNING OUTCOMES

By the end of the course, 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. Classification of plants	14
	1.2. Invertebrates	16
	1.3. The Human Breathing system	18
2.0. Matter	2.1. Mixtures	14
	2.2. Water Pollution	18
3.0. Force and energy	3.1. Floating and Sinking	14
	3.2. Sound Energy	14
	3.3. Heat transfer	12
	Total number of lessons	120

NOTE:

The suggested number of lessons per Sub Strand may be less or more depending on the context.

Strand	Sub Strand	Specific learning outcomes	Suggested learning experiences	Suggested key inquiry questions
<p>1.0 Living things and their Environment</p>	<p>1.1 Classification of plants (14 lessons)</p> <ul style="list-style-type: none"> • Classification of plants (<i>flowering and non-flowering plants</i>) • Parts and function of flowers 	<p>By the end of the sub strand the learner should be able to:</p> <ol style="list-style-type: none"> a) classify plants into flowering and non-flowering, b) describe functions of parts of a flower, c) outline the importance of flowers in nature, d) appreciate the importance of flowers in nature. 	<ul style="list-style-type: none"> • Learners are guided to use print, non-print or braille materials to search for images of flowering and non-flowering plants. Learners with blindness are given verbal descriptions on the features of flowering and non-flowering plants. • Learners are guided to take a walk in their locality to identify, observe, manipulate and categorise plants into flowering and non-flowering plants. Learners with blindness are guided to manipulate and identify and categorise flowering and non-flowering plants. • Learners with low vision are guided to draw a flower, label parts, discuss their functions, record and share with peers. Learners with blindness are guided to mount a flower and label its parts. • In pairs, learners are guided to discuss functions of parts of a flower and make presentations. • Learners are guided to discuss the importance of flowers in nature. • Learners with low vision are guided to use digital applications to draw, paint and label flowers while learners with blindness are guided to make a tactile diagram of a flower 	<ol style="list-style-type: none"> 1. How are plants classified? 2. Why are plants important in nature?

			and label its parts.	
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Note: Learners are guided on precautions to take when handling plants as they study flowering and non-flowering plants.

Core competencies to be developed:

- **Self-efficacy:** The learner develops self-drive when making portfolios and presenting to peers in class.
- **Digital literacy:** The learner interacts with digital devices with assistive technology when using digital applications to draw, paint and label flowers.

Values:

- **Unity:** The learner enhances inclusion when appreciating the effort of others while observing, manipulating, identifying and categorising plants into flowering and non-flowering.
- **Responsibility:** The learner enhances accountability as they collect specimens of plants without destroying the environment and harming themselves.

Pertinent and Contemporary Issues (PCIs):

- **Environmental Education and Climate change:** The learner observes, identifies and categorises plants into flowering and non-flowering in their natural habitat.

Links to other learning areas:

- **Religious education:** The learner appreciates the importance of flowers as God's creation.
- **Creative arts:** The learner make tactile diagrams or uses digital applications to draw, paint and label flowers.

Suggested learning resources:

Flowering plants, tactile diagram of a flower, non-flowering plants, glue, thread, braille materials and equipment, manilla paper, digital devices with assistive technology such as screen readers, adapted keyboard and screen magnifiers, pencils, drawing book, paints and camera/mobile phone

Strand	Sub Strand	Specific learning outcomes	Suggested learning experiences	Suggested key inquiry questions
1.0 Living things and their Environment	1.2 Vertebrates (16 lessons) <ul style="list-style-type: none"> • General characteristics of vertebrates Groups of vertebrates: (<i>mammals, birds, reptiles, fish and amphibians; structural features only</i>) 	By the end of the sub strand the learner should be able to: <ol style="list-style-type: none"> describe general characteristics of vertebrates, classify vertebrates into their main groups, appreciate the importance of vertebrates in the environment. 	<ul style="list-style-type: none"> • Learners are guided to search for information from digital devices with assistive technology, print media in appropriate font and colour contrast and braille materials on the general characteristics of vertebrates. • Learners are guided to explore the school and neighbourhood to observe and identify different vertebrates. Learners with blindness are paired with sighted peers to guide them identify different vertebrates found in the neighbourhood. • Learners are guided to manipulate models of different vertebrates to identify and categorise them. • Learners are guided to use digital devices with assistive technology to identify different vertebrates and classify them in their main groups. • In groups, learners discuss common characteristics of mammals, birds, fish, reptiles 	<ol style="list-style-type: none"> 1. How do groups of vertebrates differ? 2. Why are vertebrates important in our lives?

			<p>and amphibians.</p> <p>Note: <i>The learners are guided to observe safety precautions when handling different animals.</i></p> <p>Project: Making a portfolio of different categories of vertebrates in their locality. Prior to project learners with blindness are orientated on how to take a photograph.</p>	
<p>Core competencies to be developed:</p> <ul style="list-style-type: none"> • Critical thinking and problem solving: The learner develops open-mindedness and creativity as they follow simple instructions when observing vertebrates and categorising them into groups. • Creativity and Imagination: The learner develops originality skills as they make a portfolio of different categories of vertebrates in their locality. 				
<p>Values:</p> <p>Peace: The learner enhances responsibility as they collaboratively discuss and observe safety precautions when handling different animals.</p>				
<p>Pertinent and Contemporary Issues (PCIs):</p> <ul style="list-style-type: none"> • Safety and security: The learner takes necessary precautions while handling animals. 				
<p>Links to other subjects:</p> <ul style="list-style-type: none"> • Agriculture and Nutrition: The information on characteristics of animals as living things is linked to the study of livestock in Agriculture and Nutrition. 				
<p>Suggested learning resources:</p> <p>Pictures of mammals, birds, reptiles, fish, amphibians, models of mammals, birds, reptiles, fish, amphibians, braille materials and equipment, digital devices with assistive technology such as screen readers, adapted keyboard and screen magnifiers, print materials in appropriate font and colour contrast, audio-clips, camera and flash disks.</p>				

Strand	Sub Strand	Specific learning outcomes	Suggested learning experiences	Suggested Key inquiry question(s)
<p>1.0 Living things and their Environment</p>	<p>1.3 The Human Breathing system (18 lessons)</p> <ul style="list-style-type: none"> ● Parts of the breathing system and their functions (<i>nose, trachea, lungs, diaphragm</i>) ● Symptoms and prevention of common conditions and diseases of the breathing system (<i>common colds, coughs, COVID-19, allergy and Asthma</i>) 	<p>By the end of the sub strand, the learner should be able to:</p> <ol style="list-style-type: none"> a) identify the main parts of the human breathing system, b) describe the functions of main parts of the human breathing system, c) outline the symptoms and prevention measures for common conditions and diseases of the breathing system, d) appreciate the need for maintaining a healthy breathing system. 	<ul style="list-style-type: none"> ● In groups, learners use print, non-print or braille materials to identify parts of the human breathing system. Learners with blindness are given verbal descriptions of parts of the human breathing system. ● Learners with low vision are guide to draw and label the parts of the human breathing system. Learners with blindness to manipulate a model of the human breathing system. The learners are guided to model parts of the human breathing system. ● Learners are guided to search for information on the functions of main parts of the human breathing system such as nose, windpipe and lungs. ● In pairs, learners discuss symptoms and prevention of common conditions and diseases that affect the human breathing system and share. ● Learners are guided to use simulation software, online interactive platforms or digital images to illustrate major parts of the human breathing system. Learners with blindness make a tactile diagram of human breathing system and label its parts. <p>Project: Learners are guided to make models of the human breathing system</p>	<ol style="list-style-type: none"> 1. How is the human breathing system adapted to its function? 2. How can a healthy breathing system be maintained?

			using locally available materials. Learners with blindness are guided to assemble materials for making the model and are given orientation on how to make the model.	
<p>Core competencies to be developed:</p> <ul style="list-style-type: none"> ● Digital literacy: The learner develops the skill of connecting with technology when using simulation software, online interactive platforms or digital images to illustrate major parts of the human breathing system. ● Creativity and Imagination: The learner develops exploration skills when designing different ways of modelling the human breathing system using locally available materials. 				
<p>Values:</p> <ul style="list-style-type: none"> ● Responsibility: The learner enhances accountability in protecting self and others when studying prevention of common conditions and diseases that affect the human breathing system. ● Love: The learner portrays a caring attitude while taking care of the breathing system. 				
<p>Pertinent and Contemporary Issues (PCIs):</p> <ul style="list-style-type: none"> ● Preventive health and communicable diseases: The learner discusses symptoms and prevention of common conditions and diseases that affect the human breathing system. 				
<p>Links to other Learning areas:</p> <ul style="list-style-type: none"> ● Agriculture and Nutrition: The learner observes personal hygiene when discussing symptoms and prevention of common diseases. ● Creative arts: The learner makes models of the human breathing system using locally available materials. 				
<p>Suggested Learning Resources: Simulation software, digital images of human breathing system, drawing materials, models of human breathing system such as nose, windpipe and lungs, braille materials and equipment, digital devices with assistive technology such as screen readers, adapted keyboard and screen magnifiers, print materials in appropriate font and colour contrast.</p>				

Suggested Assessment Rubric

Level Indicator	Exceeds expectation	Meets expectation	Approaches expectation	Below expectation
Ability to: <ul style="list-style-type: none"> • Classify plants into flowering and non-flowering. • Describe functions of parts of a flower. • Classify vertebrates into their main groups. • Describe the functions of main parts of the human breathing system 	The learner demonstrates four skills.	The learner demonstrates three skills.	The learner demonstrates two skills.	The learner demonstrates one skill or none.

2.0 MIXTURES, ELEMENTS AND COMPOUNDS

Strand	Sub Strand	Specific learning outcomes	Suggested learning experiences	Suggested Key inquiry questions
2.0 Mixtures, Elements and Compounds	2.1 Mixtures (14 Lessons) <ul style="list-style-type: none"> • Meaning of mixtures • Types of mixtures (<i>heterogeneous and homogeneous</i>) <i>examples of (solid-solid, solid-liquid and liquid-liquid)</i> Separating heterogeneous mixtures (<i>Winnowing, picking, sieving, using magnet, Filtering, decanting, separating funnel</i>) 	By the end of the sub-strand the learner should be able to: <ol style="list-style-type: none"> a) classify mixtures as homogeneous or heterogeneous, b) apply appropriate methods to separate heterogeneous mixtures, c) outline the applications of separating mixtures in day to day life, d) appreciate different methods of separating mixtures in day to day life. 	<ul style="list-style-type: none"> • In pairs, learners brainstorm on the meaning of the term mixture and give examples found at home and school. • Learners are guided to categorise mixtures as homogeneous (uniform) and heterogeneous (non-uniform) such as solid-solid, solid-liquid, liquid-liquid mixtures. Learners with blindness are guided to feel different mixture such as solid-solid, solid-liquid, liquid-liquid mixtures where not possible learners are given verbal description of the mixtures. • Learners are guided to carry out activities to separate heterogeneous mixtures. Learners with blindness to be paired with their sighted peers when undertaking the activity and be given one on one demonstration on the process of winnowing, picking, sieving, using a magnet, filtering, decanting and the use of a separating funnel. • Learners are guided to carry out activities to demonstrate ways of 	<ol style="list-style-type: none"> 1. How are mixtures categorised? 2. Why are mixtures separated?

			separating mixtures in day-to-day life.	
<p>Core competencies to be developed:</p> <ul style="list-style-type: none"> • Communication and collaboration: The learner develops listening and speaking skills when contributing to group decision making as they separate mixtures using appropriate methods. • Learning to learn: The learner reflects on their own experiences when carrying out activities with peers to separate different types of mixtures. 				
<p>Values:</p> <ul style="list-style-type: none"> • Social justice: The learner enhances equity when according others equal opportunities in sharing responsibilities as they work in groups to separate mixtures. 				
<p>Pertinent and Contemporary Issues (PCIs)</p> <ul style="list-style-type: none"> • Social-economic issues (financial literacy): The learner appreciates applications of separating mixtures in day-to-day life as a process of value addition. 				
<p>Links to other subjects:</p> <ul style="list-style-type: none"> • Agriculture and Nutrition: The learner applies the knowledge of separating mixtures in agricultural processes like straining milk, winnowing grains and straining honey. 				
<p>Suggested Learning Resources:</p> <ul style="list-style-type: none"> • Separating funnel, homogeneous (uniform) and heterogeneous mixture made from solid-solid mixture, solid-liquid, liquid-liquid mixture, magnets, filters / sieves, containers / beakers, braille materials and equipment. 				

Strand	Sub Strand	Specific learning outcomes	Suggested learning experiences	Suggested Key inquiry questions
<p>2.0 Matter</p>	<p>2.2 Water Pollution (18 lessons)</p> <ul style="list-style-type: none"> • <i>Meaning of the term water pollution</i> • <i>Common water pollutants</i> • <i>Effects of polluted water on living things</i> • <i>Methods of reducing water pollution</i> <p><i>Basic methods of water treatment (boiling, filtration, chemical treatment, solar treatment)</i></p>	<p>By the end of the sub strand the learner should be able to:</p> <ol style="list-style-type: none"> a) identify water pollutants in the water sources, b) outline the effects of water pollution in day-to-day life, c) identify methods of reducing water pollution in the water sources, d) apply appropriate methods of water treatment, e) advocate for safe water sources. 	<ul style="list-style-type: none"> • Learners brainstorm on water pollutants in water sources. • In groups, learners discuss the effects of water pollution in day to day life (<i>water borne diseases</i>). • Learners are guided to discuss different methods of reducing water pollution. • Learners are guided to observe safety measures when working in a water polluted environment (<i>Example: practice use of gumboots and gloves</i>). • Learners are guided to carry out activities to demonstrate methods of water treatment. Learners with blindness are given orientation on how to treat water using different methods. • Learners are guided to use print, non-print or braille media to identify water pollutants and their effects in day to day life. <p>Project: In groups, learners are guided to make functional water filters using locally available materials. Learners with blindness are supported to assemble the materials, take measurements and cut the materials.</p>	<ol style="list-style-type: none"> 1. How is water pollution dangerous? 2. Why is it important to treat water?
<p>Core competencies to be developed:</p>				

<p>Creativity and imagination: The learner develops experimenting skills when coming up with new ideas in making functional water filters using locally available materials.</p>
<p>Values: Responsibility: The learner enhances self-drive as they observe safety precautions when working in a water polluted environment. Peace: The learner enhances care by not hurting others while practising methods of water treatment.</p>
<p>Pertinent and Contemporary Issues (PCIs): Health Promotion Issues: The learner develops concern for the safety of other family members as they carry out activities to demonstrate basic methods of water treatment.</p>
<p>Links to other Learning areas: Agriculture and Nutrition: The learners apply knowledge and skills on ways of reducing pollutants is used to obtain clean water for domestic use.</p>
<p>Suggested Learning Resources: Gloves, water, gumboots, filters, sand, gravel or charcoal, scissors, cheesecloth or gauze, empty plastic bottles, sand or gravel, braille materials and equipment, digital devices with assistive technology such as screen readers, adapted keyboard and screen magnifiers, print materials in appropriate font and colour contrast.</p>

Suggested Assessment Rubric				
Level	Exceeds Expectation	Meets Expectation	Approaches Expectation	Below Expectation
Indicators				
<p>Ability to:</p> <ul style="list-style-type: none"> Classify mixtures as homogeneous or heterogeneous. Apply appropriate methods to separate heterogeneous mixtures. Identify water pollutants in the water sources. 	<p>The learner demonstrates four skills.</p>	<p>The learner demonstrates three skills.</p>	<p>The learner demonstrates two skills.</p>	<p>The learner demonstrates one skill or none.</p>

<ul style="list-style-type: none">• Identify methods of reducing water pollution in the water sources.				
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Strand	Sub Strand	Specific learning outcomes	Suggested learning experiences	Suggested Key inquiry question(s)
3.0 Force and energy	3.1 Floating and sinking (14 lessons) <ul style="list-style-type: none"> • Floating and sinking (<i>Factors that affect floating and sinking of objects in water and applications of floating and sinking</i>) 	By the end of the sub strand the learner should be able to: a) classify objects as floating or sinking in water, b) identify factors that affect floating and sinking of objects in water, c) explain applications of floating and sinking in day-to-day life, d) appreciate the use of floaters as life savers.	<ul style="list-style-type: none"> • Learners are guided to use different objects to demonstrate floating and sinking in water which include dry wood, stone, metals, plastic, cork, buoy & feathers. Learners with blindness are guide to manipulate materials that float or sink in water. • Learners are guided to carry out activities to classify objects in the environment into those that float or sink in water. Learners with blindness are guided to manipulate materials before and after putting them into water to experience those that float or sink in water. • Learners are guided to perform experiments to verify how shape and size affect floating and sinking of objects in water (<i>normal bottle tops, crushed bottle tops, and the same quantity of plasticine in different shapes</i>). Learners with blindness are guided to manipulate objects of different shape, weight and size and further put them in water to experience those that float or sink in water. • In groups, learners discuss the applications of floating and sinking in day to day life (<i>swimming, diving, use of lifesavers, water transport, floods, drowning, and surfing</i>). • Learners are guided to use digital devices with assistive technology, print or braille 	<ol style="list-style-type: none"> 1. Why do some materials float and others sink? 2. How are floaters useful in our lives?

			<p>media to search and discuss effects of flooding, mitigation measures and the use of floaters as life savers.</p> <p>Project: Learners make lifesavers from floaters made of locally available materials such as rubber tubes, wood or plastics. Learners with blindness to be supported assemble the materials for the activity.</p>	
<p>Core competencies to be developed:</p> <p>Communication and Collaboration: The learner exercises teamwork while conducting experiments, observing and classifying objects in the environment into those that float or sink in water.</p> <p>Critical thinking and problem solving: The learner develops researching skills as they explore a variety of locally available floaters to make lifesavers.</p>				
<p>Values:</p> <p>Integrity: The learner enhances honesty when choosing to do the right thing when observing and recording real results and also carrying out activities to classify objects in the environment into those that float or sink in water.</p> <p>Responsibility: The learner shows resilience in accomplishing tasks in making lifesavers from floaters made of locally available materials such as rubber tubes, wood or plastics.</p>				
<p>PCIs:</p> <p>Disaster Risk Reduction: The learner exercises weather awareness as they craft ways of mitigating the negative effects of flooding as they use digital devices to search for, observe and discuss the effects of flooding.</p>				
<p>Links to other Learning Areas:</p> <p>Agriculture and nutrition: The learner relates the concept of floating and sinking to fish farming and irrigation.</p>				
<p>Suggested Learning Resources:</p> <p>Piece of wood, Stones, piece of metal, cork, buoy or feathers, rubber tubes, bottle tops, plasticine, plastic bottles, braille materials and equipment, digital devices with assistive technology such as screen readers, adapted keyboard and screen magnifiers, print materials in appropriate font and colour contrast.</p>				

Strand	Sub Strand	Specific learning outcomes	Suggested learning experiences	Suggested Key inquiry questions
3.0 Force and Energy	3.2 Sound Energy (14 lessons) <ul style="list-style-type: none"> • Sources of sound, • Movement of sound in nature, • Effects of loud sound, • Role of sound in day-to-day life. 	By the end of the sub strand, the learner should be able to: <ol style="list-style-type: none"> a) identify sources of sound in nature, b) demonstrate the movement of sound in nature, c) describe effects of loud sound in day to day life, d) appreciate the role of sound in day to day life. 	<ul style="list-style-type: none"> • Learners are guided to carry out activities to identify sources of sound (<i>vibrating air, vibrating strings, vibrating drums</i>). Learners with blindness are orientated to use different sources of sounds to produce sounds such as plucking of a string on a musical instrument. • Learners are guided to carry out an activity to demonstrate that sound travels in all directions from a source. Learners with blindness are guided to move in different positions in the environment as they listen to sounds from a common source. The environment should be very conducive with no sound distractions when listening to sound from different directions. • Learners are guided to carry out an activity to demonstrate reflection of sound (echo) (<i>use of two tubes placed alongside a wall, a cliff, a large hall, a forest, a valley, between tall buildings</i>). Learners with blindness are guided to position themselves appropriately between two objects that reflect sound so as to hear an echo after producing a sound such as by clapping of hands. The environment should be very conducive with no sound distractions when listening to sound reflection (echoes) from different sources. • In groups, learners discuss the effects of loud sound in the environment and share with peers. • Learners are guided to use digital devices with assistive technology, print or braille media to 	<ol style="list-style-type: none"> 1. How is sound produced? 2. How does sound travel?

			<p>search for the effects of loud sound in day to day life.</p> <ul style="list-style-type: none"> ● In pairs, learners discuss the role of the government in addressing sound pollution. <p>Project 1: Learners are guided to make a sound producing instrument from locally available materials. <i>(For example: bell, drum, guitar, wind instruments, etc.)</i> Learners with blindness are guided to assemble and orientated to make the instruments.</p> <p>Project 2: Learners are guided to create a sound game using Scratch. Learners with blindness to be paired with their sighted peers when creating and developing a sound game involving drag and drop activity in Scratch.</p>	
<p>Core competencies to be developed:</p> <p>Creativity and imagination: The learner develops exploration skills when experimenting different ways of making sound producing instruments using locally available materials.</p> <p>Digital literacy: The learner uses appropriate digital devices with assistive technology to create and add sound effects using the "Sound" blocks in Scratch.</p>				
<p>Values:</p> <p>Responsibility: The learner enhances persistence as they undertake safety precaution measures to minimise the effects of loud sound in the environment.</p>				
<p>Pertinent and Contemporary Issues (PCIs):</p> <p>Citizenship: The learner acquires awareness on human rights and responsibilities as they discuss the role of the government in addressing sound pollution.</p> <p>Environmental education and climate change: The learner develops creativity and environmental awareness as they discuss with peers the effects of loud sound in the environment.</p>				
<p>Links to other subjects:</p> <p>Creative arts: The learner makes sound producing instruments using locally available materials.</p>				

Suggested Learning Resources

Bell, wind instruments like horns and trumpets, digital devices with assistive technology, scalpel or scissors, strings or a piece of wire, braille materials and equipment, digital devices with assistive technology such as screen readers, adapted keyboard and screen magnifiers, print materials in appropriate font and colour contrast.

Strand	Sub Strand	Specific learning outcomes	Suggested learning experiences	Suggested Key inquiry questions
3.0 Force and Energy	3.3 Heat transfer (12 lessons) <ul style="list-style-type: none"> ● modes of heat transfer in nature, ● classification of conductors of heat into good or poor conductors, ● uses of heat transfer in day to day life, ● safety precautions when handling heat. 	By the end of the sub strand the learner should be able to: <ol style="list-style-type: none"> a) demonstrate the modes of heat transfer in nature, b) classify conductors of heat into good or poor conductors, c) explain the uses of heat transfer in day to day life, d) acknowledge safety precautions when handling heat. 	<ul style="list-style-type: none"> ● Learners brainstorm on the meaning of the terms conduction, convection and radiation as used in heat transfer. ● Learners are guided to perform experiments to demonstrate the modes of heat transfer which include conduction, convection and radiation. Learners are guided to feel a metal rod connected to a source of heat, feel water before and after boiling and sun bask. Learners with blindness are given verbal description of the aspects of the activity that require sight such as the convectional current that occurs in water when water is being heated. <i>Precaution: Learners to keep a safe distance from a source of heat.</i> ● Learners are guided to carry out experiments to identify good and poor conductors of heat. Learners with blindness are guided to gently attach one end of the material to a source of heat so as identify good and bad conductors of heat. <i>Precaution: Learners to keep a safe distance from a source of heat.</i> 	<ol style="list-style-type: none"> 1. How is heat transferred through materials in nature? 2. Why is heat important in day to day life?

			<ul style="list-style-type: none"> ● In groups, learners discuss applications heat of transfer in day to day life which include cooking, melting, freezing, maintaining body temperature and insulation. ● Learners are guided to use digital devices with assistive technology or print, braille media to search for information on heat transfer on day to day life. ● In groups, learners discuss safety precautions when handling heat. ● Learners are guided to discuss various ways of responding to fire emergencies. <p>Project 1: Learners are guided to make oven gloves using locally available materials. Learners with blindness are guided to assemble the materials, trace the hand, take measurement, cut materials and sew the oven gloves.</p> <p>Project 2: Learners are guided to make a fireless cooker. Learners with blindness are guided to assemble the materials and are orientated to make the cooker.</p>	
<p>Core competencies to be developed: Self-efficacy: The learner develop self-confidence when performing experiments in groups to demonstrate the modes of heat transfer.</p>				

Values:

Social justice: The learner enhances equity when sharing resources equitably as they perform experiments to identify good and poor conductors of heat.

Pertinent and Contemporary Issues (PCIs):

Safety and Security: The learner exercises fire emergency response measures as they discuss various ways of responding to fire emergencies.

Links to other Learning areas:

Agriculture and Nutrition: The learner links the concept of heat transfer in choosing of appropriate material for knitting the oven gloves.

Suggested Learning resources:

Rubber, glass, a piece of metal, sand, wood, hay/ piece of cloth/ sand (for insulation), braille materials and equipment, digital devices with assistive technology such as screen readers, adapted keyboard and screen magnifiers, print materials in appropriate font and colour contrast.

Suggested Assessment Rubric				
Level	Exceeds expectation	Meets expectation	Approaches expectation	Below expectation
Indicators				
Ability to: <ul style="list-style-type: none"> • Classify objects as floating or sinking in water. • Identify sources of sound in nature. • Demonstrate the movement of sound in nature. • Classify conductors of heat into good or poor conductors. 	The learner demonstrates four skills.	The learner demonstrates three skills.	The learner demonstrates two skills.	The learner demonstrates one skill or none.

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 of the CSL activity 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
<p>1) Preparation</p> <ul style="list-style-type: none">● Map out the targeted core competencies, values and specific learning areas 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
<p>2) Implementation CSL Activity</p> <ul style="list-style-type: none">● 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.
<p>3) Reflection on the CSL Activity</p> <p>Conduct a self-evaluation session with learners on the integrated CSL activity undertaken by discussing the following:</p> <ul style="list-style-type: none">● 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 Pertinent and Contemporary Issues (PCIs): and concepts from the various Learning Areas. Teachers are expected to vary the themes yearly to allow learners to address different Pertinent and Contemporary Issues (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

Assessment Methods in Science	Learning Resources	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 in print and braille ● Anecdotal Records 	<ul style="list-style-type: none"> ● Adapted Laboratory Apparatus and Equipment ● Textbooks in print and braille ● Software ● Relevant reading materials ● Digital Devices with assistive technology ● Recordings 	<ul style="list-style-type: none"> ● Visit the science historical sites. ● Use digital devices with assistive technology to conduct scientific research. ● Organizing walks to have live learning experiences. ● Developing simple guidelines on how to identify and solve some community problems. ● Conducting science document analysis. ● Participating in talks by resource persons on science concepts. ● Participating in science clubs and societies ● Attending and participating science and engineering fairs ● Organizing and participating in exchange programmes. ● Making oral presentations and demonstrations on science issues.