



REPUBLIC OF KENYA

MINISTRY OF EDUCATION

UPPER PRIMARY CURRICULUM DESIGN

SCIENCE & TECHNOLOGY

GRADE 6

FOR LEARNERS WITH VISUAL IMPAIRMENT



KENYA INSTITUTE OF CURRICULUM DEVELOPMENT

A Skilled and Ethical Society

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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 six curriculum designs for learners with visual impairment build on competencies attained by learners at Grade 5. 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.

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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 Six curriculum furthers implementation of the CBC from Grade Five. 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 six 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 six and prepare them for smooth transition to Junior School. Furthermore, it is my hope that teachers will use the adapted designs to make learning interesting, exciting and enjoyable.

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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 six 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 six 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 six and preparation of learners with visual impairment for transition to Junior School.



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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 PRIMARY

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 the end of the 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-fulfillment
- 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 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 industrialization, 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 visual impairment 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 with visual impairment 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 with visual impairment, 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>) <i>Note: scientific names and details on application of fungi in food processing not required</i>	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, b) describe the importance of fungi in nature, c) appreciate the importance of fungi in the economy. 	<ul style="list-style-type: none"> ● Learners are guided to use print, braille or non-print materials to search for images of common fungi such as puffballs, toadstools, mushrooms and moulds and make presentation. ● In pairs, learners take a walk in the school compound and the adjacent environment to observe and identify different types of Fungi. Learners with blindness are guided to manipulate different types of fungi such as mushrooms. ● Learners are guided to grow moulds on available food materials, observe and share with peers. Learners with blindness are given one on one orientate on how to prepare food materials to grow moulds. Learners are guided to manipulate food materials with moulds. ● Learners are guided to use print, braille or non-print materials to search for information on the economic importance of moulds, yeast and mushrooms, record and discuss with peers. 	How are fungi important in nature?

		<p>Note: <i>Learners are guided to observe precautions and safe disposal of wastes when handling fungi.</i></p>	
<p>Core competencies to be developed:</p> <ul style="list-style-type: none"> ● Communication and collaboration: The learner acquires speaking and listening skills during a discussion on 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.</p>			
<p>Pertinent and Contemporary Issues</p> <ul style="list-style-type: none"> ● 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. 			
<p>Links to other learning areas: Agriculture and Nutrition: The learner is able to link information on the economic importance of fungi to food production.</p>			
<p>Suggested learning resources Puffballs, toadstools, mushrooms and moulds, 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, Gloves, face masks and dustcoat.</p>			

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question (s)
1.0 Living things and the 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>) <i>Note: scientific names not required</i>	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) observe 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. 	<ul style="list-style-type: none"> ● Learners are guided to use print, non-print or braille material to search for information on common invertebrates and share the findings with peers. ● In groups, learners discuss safety precautions applied when handling invertebrates. ● Learners are guided to use print, non-print or braille materials to search for information on general characteristics of invertebrates, ● In pairs, learners explore the school compound and the adjacent environment to identify different invertebrates and their characteristics. Learners with blindness are guided to manipulate harmless invertebrates to identify their characteristics. Learners are given verbal description of different 	How are the invertebrates?

			invertebrates to identify their characteristics. <ul style="list-style-type: none"> • Learners make an inventory of common invertebrates in their locality. • Learners are guided to discuss the economic importance of invertebrates. 	
Core competencies to be developed: <ul style="list-style-type: none"> • Critical thinking and problem solving: The learner identifies solutions to some economic problems as they discuss the economic importance of invertebrates. • Creativity and Imagination: The learner thinks critically, imagines and innovatively creates an inventory of common invertebrates in their locality. 				
Values: 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.				
Pertinent and Contemporary Issues: <ul style="list-style-type: none"> • 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. • Safety and security: The learner practices and observes safety precautions in handling animals as they discuss safety precautions applied when handling invertebrates. • Health Promotion Issues: The learner discusses the role of invertebrates in transmission of diseases as they discuss safety precautions applied when handling invertebrates. 				
Links to other learning areas: Agriculture and Nutrition. The learner is able to link information on transmission of diseases to communicable diseases.				

Suggested Learning Resources:

Braille materials and equipment,

Digital devices with assistive technology such as screen readers, adapted keyboard and screen magnifier,

Print materials in appropriate font and colour contrast,

Specimens of: Cockroach, beetle, crabs, worms, millipede and centipede.

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>), <i>Note: details of different blood vessels and parts of the body not needed.</i> ● Parts of the heart and their functions ● Major blood vessels and their functions 	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. 	<ul style="list-style-type: none"> ● Learners use print, non-print or braille materials to search for information on the main parts of the human circulatory system and share the finding with peers. ● Learners are guided to use locally available material to model the human circulatory system and share the finding with peers. Learners with blindness are given one on one orientation on how to model the human circulatory system. ● Learners with low vision are guided to use online interactive platforms or digital images or writing materials to illustrate main parts of the human circulatory system. Learners with blindness use a model of the human circulatory system to identify its parts. ● Learners are guided to use print, non-print or braille material to search for information on parts of the heart 	How is the human circulatory system made up of?

	<ul style="list-style-type: none"> • Components of blood and their functions • symptoms and prevention of common health conditions of the human circulatory system, (<i>hardening of arteries, high blood pressure and heart attack</i>) 	<p>circulatory system,</p> <p>d) develop a routine plan for maintaining a healthy circulatory system</p> <p>e) appreciate the importance of a healthy circulatory system.</p>	<p>(<i>auricles, ventricles and vessels</i>) and their functions, record and share their findings with peers.</p> <ul style="list-style-type: none"> • Learners are guided to discuss the functions of the main blood vessels in the human body (<i>arteries, veins and capillaries</i>). • In groups, learners discuss components of blood and their functions, record and share (<i>red blood cells, white blood cells and platelets</i>). • Learners are guided to search for information on the symptoms and prevention of common health conditions of the human circulatory system and share the findings with peers. • Learners are guided to discuss ways of maintaining a healthy human circulatory system. • In pairs, learners discuss 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 respects others opinions as they collaboratively discuss and develop a routine plan on maintaining a healthy human circulatory system.

Pertinent and Contemporary Issues:

Health Promotion Issues: The learner learns ways of living healthy as they discuss ways of maintaining a healthy human circulatory system and develops a routine for maintaining a healthy circulatory system.

Links to other learning areas:

- **Agriculture and Nutrition:** The learner is able to link information on common health conditions of the human circulatory system to lifestyle diseases.
- **Creative arts:** The learner is able to relate modelling of the human circulatory system to modelling.

Suggested Learning Resources:

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,
Model of human circulatory system,
Tactile diagrams of human circulatory system,
Plasticine or clay, straws, balloons.

Suggested Assessment Rubric

Level Indicators	Exceeds Expectations	Meets Expectations	Approaches Expectations	Below expectations
Ability to: <ul style="list-style-type: none"> ● Describe the importance of fungi. ● Practise precautions in handling invertebrates. ● Outline the economic importance of invertebrates. ● Describe functions of main parts of the human circulatory system. 	The learner demonstrates four skills.	The learner demonstrates three skills.	The learner demonstrates two skills.	The learner demonstrates one skill or none.

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 in day to day life. 	<ul style="list-style-type: none"> ● In groups, learners brainstorm the meaning of change of state of matter. ● Learners are guided carry out activities to demonstrate change of state of matter. Learners with blindness are given orientation on cooling and heating different sates of matter. <p><i>Hint: observe safety while heating substances to avoid fires and burns</i></p> <ul style="list-style-type: none"> ● Learners are guided to use print, non-print or braille media to search and discuss changes of states when substances are heated or cooled. ● In pairs, learners discuss the applications of change of state of matter in everyday life. ● Learners are guided to use digital devices with assistive technology, print or braille media to search for information on what happens when matter is heated or cooled. <p>Project:</p> <ul style="list-style-type: none"> ● Learners to make candles using waste candle wax or beeswax. 	How is change of state of matter important in day to day life?

			<p>Learners with blindness are guided to assemble the material and are supported to heat waste candle or bee wax to form candle.</p> <p><i>Precaution: observe safety when heating substances.</i></p> <ul style="list-style-type: none"> • Learners to repair broken plastic containers. <p>Learners with blindness are supported on the aspect of the project that require use of sight such as heating substances and repairing the plastics.</p>	
<p>Core competencies to be developed:</p> <ul style="list-style-type: none"> • Communication and collaboration: The learner acquires speaking and listening skills as they brainstorm in groups 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. 				
<p>Values: Respect: The learner appreciates diverse opinions of others while discussing the change of state of matter in everyday life.</p>				
<p>Pertinent and contemporary Issues: Socio-economic issues (Environmental Education): The learner practices ways of conserving environmental as they make candles using waste candle wax or beeswax and repairing broken plastic containers to save on the cost.</p>				
<p>Linkage to other learning areas: Agriculture and Nutrition: The learner relates the concept of evaporation as a process of drying clothes and cereals.</p>				
<p>Suggested Learning Resources 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, Bee wax,</p>				

Broken plastics,
Source of heat,
Different states of matter; solid, liquid and gas.

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"> ● <i>Composition of air in the atmosphere</i> ● <i>Uses of different components of air</i> ● <i>Air pollution</i> 	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. 	<ul style="list-style-type: none"> ● Learners are guided to brainstorm on the meaning of air and it's constituent. ● Learners with low vision are guided to draw a pie chart showing percentage composition of components of air. Learners with blindness guided to make and interpret a tactile pie chart. ● Learners are guided to carry out an activity to investigate the presence of oxygen in air. (<i>use a burning candle</i>). Learners with blindness are given verbal description on aspects of the activity that require sight such as the rising of water in the gas jar as the candle burns, and colour of rust on materials. ● In groups, learners discuss the uses of the different components of air. ● Learners brainstorm on the meaning of air pollution. ● In pairs, learners explore the school and neighborhood to identify air pollutants. Learners with blindness are paired with 	How does air pollution affect the environment?

			<p>sighted peers to orientate them identify the pollutants.</p> <ul style="list-style-type: none"> • Learners are guided to discuss the effects of air pollution to the environment. • Learners identify and discuss methods of reducing air pollution. • Learners are guided to use digital devices with assistive technology, print or braille media to search for more information on the effects of air pollution. <p><i>Hint: observe safety precautions in air polluted environments (Example: practice use of dust masks, goggles, overcoats).</i></p> <p>Project: Learners are guided to make print or tactile posters on common air pollutants, dangers of air pollution and ways of controlling air pollution.</p>	
<p>Core competencies to be developed:</p> <ul style="list-style-type: none"> • 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. • Learning to learn: The learner learns new skills of controlling air pollutants as they explore the school and neighborhood to identify air pollutants. 				

Values:

- **Responsibility:** The learner observes safety precautions in an air polluted environment as they identify and discuss methods of reducing air pollution.
- **Patriotism:** The learner serves the community by making print or tactile posters on common air pollutants, dangers of air pollution and ways of controlling air pollution to educate members of the community.

Pertinent and Contemporary Issues:

Environmental education and climate change: The learner practices ways of environmental conservation as they identify and discuss methods of reducing air pollution.

Link to other learning areas

Mathematics: The learner uses mathematical skills to draw a pie chart showing the percentage composition of components of air.

Suggested Learning Resources

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,
Glue,
Thread,
Manilla paper.

Suggested Assessment Rubric

Level Indicators	Exceeds Expectations	Meets Expectations	Approaches Expectations	Below expectations
Ability to: <ul style="list-style-type: none"> ● Identify the changes of state when substances are heated or cooled. ● Outline uses of the different components of air ● Identify the components of air. ● Explain the effects of air pollution to the environment 	The learner demonstrates four skills.	The learner demonstrates three skills.	The learner demonstrates two skills.	The learner demonstrates one skill or none.

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"> ● <i>Movement of light through materials</i> ● <i>Ray diagrams of images in plane mirrors</i> ● <i>Formation of shadows and eclipses</i> ● <i>Reflection of light at plane surfaces</i> ● <i>Image formation in plane mirrors</i> ● <i>Rainbow formation</i> 	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 on plane mirrors, <i>(for learners with low vision)</i> c) interpret tactile ray diagrams of images formed in plane mirrors, <i>(learners with blindness)</i> d) illustrate the formation of shadows and eclipses in nature 	<ul style="list-style-type: none"> ● In groups, learners carry out activities to show the movement on light through different materials <i>(transparent, translucent and opaque)</i>. Learners with blindness are guided to manipulate transparent, translucent and opaque materials. Learners with blindness are given verbal descriptions of the movement of light through different materials. ● Learners with low vision perform an experiment to show reflection of light on plane mirrors <i>(laws of reflection)</i>. Learners with blindness are guided to manipulate materials used in the experiment and are given verbal descriptions on the procedure for the experiment and the expected observation. ● Learners with low vision are guided to locate and illustrate images formed on 	How does light travel?

		<p>.(for learners with low vision)</p> <p>e) describe the formation of shadows and eclipse in nature, (learners with blindness),</p> <p>f) describe the formation of rainbow in nature,</p> <p>g) Appreciate the importance of movement light in everyday life.</p>	<p>plane mirrors and discuss their characteristics.</p> <ul style="list-style-type: none"> ● Learners with blindness are guided to manipulate and interpret tactile ray diagrams of images formed in plane mirrors and further state the characteristics of the images formed. ● Learners with low vision carry out activities to demonstrate and illustrate the formation of shadows and eclipses (solar & lunar eclipses). ● Learners with blindness are guided to search for information about formation of eclipses and make presentations. ● Learners are guided to use digital devices with assistive technology, print or braille media to search for information on the movement of light through materials, image formation on plane mirrors, the formation of shadows, eclipses and rainbow in nature. ● In groups, learners discuss the applications of movement of light through different media (mirrors, periscope, kaleidoscope, lenses, 	
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			<p><i>magnifying glass, hand lens, mirage, and rainbow).</i></p> <p>Project: Learner uses locally available resources to make a functional periscope. Learners with blindness are supported on the aspect of the project that require use of sight such as taking measurement and using the periscope.</p>	
<p>Core competencies to be developed:</p> <ul style="list-style-type: none"> ● Digital literacy: The learner interacts with digital devices with assistive technology as they use digital or print media to search for information on the movement of light through materials, image formation on plane mirrors, the formation of shadows, eclipses and rainbows in nature. ● Communication and Collaboration: The learner cooperates and work together harmoniously with peers as they discuss the applications of movement of light in different media. 				
<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>Agriculture and nutrition: The learner is able to relate the concept of ray of light in lighting up the home.</p>				
<p>Suggested Learning Resources:</p>				

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,
 Transparent, translucent and opaque materials.

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"> ● <i>Examples of levers</i> ● <i>Parts of levers</i> ● <i>Classification of levers</i> ● <i>uses of levers in day to day life</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) describe the use of levers in making work easier, e) appreciate the use of levers in making work easier. 	<ul style="list-style-type: none"> ● In groups, learners brainstorm on the meaning of levers as simple machines. ● Learners are guided to identify parts of a lever (<i>fulcrum/pivot, effort, and load</i>). Learners with blindness are guided to manipulate a seesaw to identify pivot, effort and load. ● In pairs, learners carry out activities to group levers into the three classes. (<i>first-, second- and third-class levers</i>). Learners with blindness are guided to manipulate different types of levers and classify them into different classes. Learners can also be given verbal descriptions of different types of levers then they categorize. 	How are levers used in our everyday life?

			<ul style="list-style-type: none"> ● Learners are guided carry out activities to demonstrate the use of common levers as simple machines. Learners with blindness are guided to manipulate simple machines and are given orientation on the use of common lever. (<i>a hole punch, pliers, scissors, a see-saw, wheelbarrow, bottle openers, nail clippers, a nutcracker, shovel, fishing rod, kitchen tongs and tweezers.</i>) ● Learners are guided to use digital devices with assistive technology, print or braille 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. Learners with blindness are supported to assemble material and are orientated on how to make a beam balance.</p>	
<p>Core competencies to be developed</p> <ul style="list-style-type: none"> ● 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 to demonstrate 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.
- Creative Arts: Learner is able to apply the concepts of simple levers as they play on a seesaw.

Suggested Learning Resources

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,

A hole punch, pliers, scissors, a see-saw, wheelbarrow, bottle openers, nail clippers, a nutcracker, shovel, fishing rod, kitchen tongs and tweezers.

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) carry out experiment to demonstrate how a slope makes work easier in day to day life, c) appreciate the use of slopes in everyday life. 	<ul style="list-style-type: none"> ● In groups, learners discuss the meaning of slope as a simple machine (<i>inclined plane</i>). ● Learners give practical examples on where slopes are used to make work easier around the school environment (<i>ladders, ramps, staircase, road winding up-hill, wedge, roofs, loading a lorry</i>). Learners with blindness are given orientation on slopes that are within the environment and how they make work easier. ● In groups, learners are guided to discuss how slopes are used to make work easier in day to day life. ● Learners are guided to carry out activities to show how slopes make work easier. Learners with blindness are given orientation on how to use slopes to make work easier. ● Learners are guided to use digital devices with assistive technology, print or braille media to search for 	How are slopes used in everyday life?

			<p>information on how slopes make work easier. (<i>elevators/lifts, escalators/moving stairs, stair case, ladders, cableways, ramps, road winding up-hill, wedge, roofs, loading a lorry</i>),</p> <ul style="list-style-type: none"> ● Learners are guided to discuss the importance of use of slopes in day to day life. <p>Project: Learners make a simple slope for use in school or at home using locally available materials. Learners with blindness are guided to assemble materials and orientated to how to make a simple slope.</p>	
<p>Core competencies to be developed:</p> <ul style="list-style-type: none"> ● 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. 				
<p>Values: Integrity: The learner learns how to utilise resources prudently while making a simple slope for use in school or at home.</p>				
<p>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.</p>				

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.

Suggested Assessment Rubric

Level Indicators	Exceeds Expectations	Meets Expectations	Approaches Expectations	Below expectations
Ability to: <ul style="list-style-type: none"> ● Illustrate the formation of shadows and eclipses in nature. ● Use levers to make work easier. ● Classify levers into the three classes. ● Carry out experiments to demonstrate how a slope makes work easier in day to day life. 	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	
1) Preparation	<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
2) Implementation CSL Activity	<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.

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

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 ● Print or braille textbooks ● 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.