REPUBLIC OF KENYA

MINISTRY OF EDUCATION
PRIMARY SCHOOL CURRICULUM DESIGN

SCIENCE AND TECHNOLOGY

FOR LEARNERS WITH PHYSICAL IMPAIRMENT

GRADE 6

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 Five Curriculum designs for learners with Physical 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,
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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 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 Physical 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.

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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 Physical 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 Physical 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 Physical Impairment for transition to Grade Six.

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

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

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

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

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

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

LESSON ALLOCATION AT UPPER PRIMARY

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

GENERAL LEARNING OUTCOMES FOR PRIMARY EDUCATION

By the 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 universe. Science is a discipline that deals with explanations and predictions about nature and the universe while Technology is the application of science to create devices that can solve problems and do tasks.

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

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

SUBJECT GENERAL LEARNING OUTCOMES

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

1) Interact with the environment for learning and sustainable development.
2) Apply digital literacy skills appropriately for communication, learning and enjoyment.
3) Appreciate the contribution of science and technology in the provision of innovative solutions.
4) Use scientific knowledge to observe and explain the natural world.
5) Make functional discoveries that impact individuals and the wider society.
6) 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**)** ● *Common Fungi (mushrooms, toadstool, puff balls, yeast and moulds)* ● *Importance of Fungi (food, fermentation, health and medicine)* ***Note:*** *scientific names and details on application of fungi in food processing not required*	By the end of the sub strand the learner should be able to; a) identify common fungi in the environment, b) describe the importance of fungi in nature, c) appreciate the importance of fungi in the economy.	The learner is guided to: • Use print and non-print materials to search for images of common fungi such as puffballs, toadstools, mushrooms and moulds, share findings with peers. Control light intensity for learners who are sensitive to light while using digital devices. Those who may not turn pages to use page turners or be supported by peers. • Take a walk/move in the school compound and the adjacent environment to observe and identify different types of fungi. Learners with mobility difficulties could be given physical support by peers, learner support assistant or teacher as they explore. • Grow moulds on available food materials, observe and share with peers.	How if Fungi important in nature?

			• Use print and non-print materials to search for information on the economic importance of moulds, yeast and mushrooms, record and discuss with peers. Learners with manipulation difficulties could use adapted writing materials or type on appropriate adapted digital devices to record findings. Learners with speech difficulties could use Alternative modes of Communication to express their views during discussion. **Note:** *Learners are guided to observe precautions and safe disposal of wastes when handling fungi.*	

Core competencies to be developed:

- 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.

Values:

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

Pertinent and Contemporary Issues

- Financial Literacy: The learner learns about economic activities as they use print and non-print materials to search for

information on the economic importance of moulds, yeast and mushrooms. ● Environmental conservation**:** The learner learns how to conserve environment as they observe precautions and safe disposal of wastes when handling fungi.
Links to other learning areas: The learner is able to link information on the economic importance of Fungi to food production in Agriculture and Nutrition.

Strand	**Sub Strand**	**Specific Learning Outcomes**	**Suggested Learning Experiences**	**Suggested Key Inquiry Question (s)**
1.0 Living things and the Environment	**1.2 Invertebrates** (14 lessons) ● *Common Invertebrates: (insects; spiders, ticks and mites; millipedes and centipedes; snails and slugs;worms; Sea invertebrates - octopus, starfish and crabs)* ● *Importance of invertebrates*	By the end of the sub strand the learner should be able to; a) identify common invertebrates in the environment, b) practise precautions in handling invertebrates, c) describe the general characteristics of invertebrates, d) outline the economic importance of invertebrates, e) appreciate the importance of invertebrates in nature.	The learner is guided to: ● Use print and non-print material to search for information on common invertebrates and share the findings with peers. Those who may not turn pages to use page turners or be supported by peers. ● Discuss purposive groups the safety precautions applied when handling invertebrates. Learners with speech difficulties could use residual speech/ digital devices with text-to-speech application/ point/sign/write during the discussion. ● Collaboratively use print and	How can invertebrates be identified?

	(food, pollination, soil aeration, pests, transmission of diseases) ***Note: scientific names not required***		non-print materials to search for information on general characteristics of invertebrates. • Explore the school compound and the adjacent environment in purposive groups to identify different invertebrates and their characteristics; practise safety precautions in handling invertebrates. Learners with mobility difficulties could be given physical support by peers, learner support assistant or teacher as they explore. • Make an inventory of common invertebrates in their locality. • Discuss the economic importance of invertebrates in purposive pairs or groups. Learners with speech difficulties could be given extra time to express themselves	
Core competencies to be developed: • 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: • 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: The learner is able to link information on transmission of diseases to communicable diseases in Agriculture and Nutrition.

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) ● *Parts of the human circulatory system (heart, blood vessels and blood),* ***Note:*** *details of*	By the end of the sub strand the learner should be able to; 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	The learner is guided to: • Use print and non-print materials to search for information on the main parts of the human circulatory system and share the finding with peers. Those who may not turn pages to use page turners or be supported by	1. Which are the main parts of the human circulatory system? 2. How can we keep the human circulatory system healthy?

	different blood vessels and parts of the body not needed. ● *Parts of the heart and their functions* ● *Major blood vessels and their functions* ● *Components of blood and their functions* ● *symptoms and prevention of common health conditions of the human circulatory system, (hardening of arteries, high blood pressure and heart attack)*	common health conditions of the human circulatory system, d) develop a routine plan for maintaining a healthy circulatory system, e) appreciate the importance of a healthy circulatory system.	peers. • Use locally available material to model the human circulatory system and share the finding with peers. Learners with manipulation difficulties could use alternative functional parts of the body, given physical support by peers/learner support assistant to carry out the project. • Use online interactive platforms, digital images or adapted writing materials to illustrate main parts of the human circulatory system. Learners with manipulation or fine motor difficulties could be assisted by peers or teacher aide as they carry out the experiments. • Use print and non-print material to search for information on parts of the heart *(auricles, ventricles*	

			and vessels) and their functions, record and share their findings with peers. ● Discuss in purposive groups/pairs the functions of the main blood vessels in the human body *(arteries, veins and capillaries).* Learners with speech difficulties could use residual speech/ digital devices with text-to-speech application/ point/sign/write during the discussion, or they could be given extra time to express themselves. ● Discuss in purposive groups/pairs the components of blood and their functions, record and share findings *(red blood cells, white blood cells and platelets).* ● Search for information on the symptoms and prevention of common health conditions of the human circulatory system and share the findings with peers.	

			• Discuss in purposive groups/pairs ways of maintaining a healthy human circulatory system. Learners with speech difficulties could use Alternative modes of Communication to express their views during discussion or they could be given extra time to express themselves. • Discuss and develop a routine plan for maintaining a healthy circulatory system in pairs and do a presentation *(to include drinking plenty of water, physical activities and healthy eating).*	

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 discusses ways of maintaining a healthy human circulatory system and develops a routine for maintaining a healthy circulatory system.
Links to other learning areas: • The learner is able to link information on common health conditions of the human circulatory system to lifestyle diseases in Agriculture and Nutrition. • The learner is able to relate modelling of the human circulatory system to modelling in Creative arts and Sports.

Suggested Assessment Rubric

Level / Indicators	Exceeds Expectations	Meets Expectations	Approaches Expectations	Below expectations
Ability to describe the importance of fungi.	The learner describes the importance of fungi comprehensively.	The learner describes the importance of fungi correctly.	The learner describes most of the importance of fungi.	The learner partially describes a few importance of fungi.
Ability to practise precautions in handling invertebrates.	The learner practises all precautions in handling invertebrates giving illustrations.	The learner practises all precautions in handling invertebrates.	The learner practises most of the precautions in handling invertebrates.	The learner practises a few precautions in handling invertebrates.
Ability to outline the economic importance of invertebrates.	The learner outlines the economic importance of invertebrates giving example(s) from the locality.	The learner outlines all the economic importance of invertebrates correctly.	The learner outlines most of the economic importance of invertebrates correctly.	The learner outlines a few economic importance of invertebrates.

Ability to describe functions of main parts of the human circulatory system.	The learner describes all functions of main parts of the human circulatory system comprehensively.	The learner describes all functions of main parts of the human circulatory system.	The learner describes most of the functions of main parts of the human circulatory system.	The learner describes a few functions of main parts of the human circulatory system.
Ability to develop a routine plan for maintaining a healthy circulatory system.	The learner develops a comprehensive routine plan for maintaining a healthy circulatory system.	The learner develops a routine plan for maintaining a healthy circulatory system.	The learner develops a simple routine plan for maintaining a healthy circulatory system.	The learner develops an incomplete routine plan for maintaining a healthy circulatory system.

STRAND 2.0 MATTER

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question (s)
2.0 Matter	**2.1 Change of state** (18 lessons) ● *Changes of state of matter. (melting evaporation, sublimation, deposition, condensation and freezing)* ● *Application of change of state of matter*	By the end of the sub strand the learner should be able to; 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.	**The learner is guided to:** ● Brainstorm the meaning of change of state of matter. Learners with speech difficulties could use alternative modes of communication to express their views as they brainstorm. ● Carry out activities to demonstrate change of state of matter. Learners with manipulation difficulties could use alternative functional parts of the body, given physical support by peers/learner support assistant to carry out the activity. Adapted working surfaces should be provided. Extra time could be allowed for learners to complete the task. ● Discuss in purposive groups the applications of change of state	How is change of state of matter important in day to day life?

			of matter in everyday life. ● Use digital or print media to search for information on what happens when matter is heated or cooled. Adjust light/ glare on the screens of the digital devices appropriately for learners who are sensitive to light**. Note**: *observe safety while heating substances to avoid fires and burns.* **Project**: ● Learners to make candles using waste candle wax or beeswax. Learners with manipulation difficulties could use alternative functional parts of the body, given physical support by peers/learner support assistant to carry out the project. ● Learners to repair broken plastic containers.	

Core competencies to be developed:

- Communication and collaboration: The learner acquires speaking and listening skills as they brainstorm the meaning of change of state of matter.
- Learning to learn: The learner learns the best procedural practices of changing states as they carry out activities to demonstrate change of state of matter.

Values: Respect: The learner appreciates diverse opinions of others while discussing the change of state of matter in everyday life.
Pertinent and contemporary Issues: Socio-economic issues (Environmental Education): The learner 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.
Linkage to other learning areas: The learner relates the concept of evaporation as a process of drying clothes and cereals in Agriculture and Nutrition.

Strand	**Sub Strand**	**Specific Learning Outcomes**	**Suggested Learning Experiences**	**Suggested Key inquiry Question (s)**
2.0 Matter	**2.2 Composition of air** (16 lessons**)** ● *Composition of air in the atmosphere* ● *Uses of different components of air* ● *Air pollution*	By the end of the Sub Strand, the learner should be able to; 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	**The Learner is guided to:** • Brainstorm in purposive groups, on the meaning air and its constituent. Learners with speech difficulties could use alternative modes of communication to express their views. • Draw/trace a pie chart showing percentage composition of components of air in purposive pairs/groups. Learners with fine motor difficulties could use alternative functional parts of the body, given physical support by peers/learner support assistant to draw. Adapted working surfaces should be	How does air pollution affect the environment?

		clean air in day to day life.	provided. Extra time could be allowed for learners to complete the task. • Carry out activity to investigate the presence of oxygen in air collaboratively *(use a burning candle).* Learners with manipulation difficulties could use alternative functional parts of the body, given physical support by peers/learner support assistant to carry out the activity. • Discuss in purposive pairs/groups the uses of the different components of air. Learners with speech difficulties could be given extra time to express themselves. • Brainstorm in purposive pairs/groups on the meaning of air pollution. • Explore the school and neighborhood to identify air pollutants. Learners with mobility difficulties could be given physical support by peers, learner support assistant or teacher as they explore. • Discuss the effects of air pollution to the environment. • Identify and discuss with peers	

			methods of reducing air pollution. • Use digital or print media to search for more information the effects of air pollution. Adjust light/ glare on the screens of the digital devices appropriately for learners who are sensitive to light. **Note**: *observe safety precautions in air polluted environments (example: practice use of dust masks, goggles, overcoats).* **Project:** Learners are guided in purposive groups to make posters on common air pollutants, dangers of air pollution and ways of controlling air pollution. Learners with manipulation difficulties could use alternative functional parts of the body, given physical support by peers/learner support assistant to carry out the activity	
Core competencies to be developed: ● 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 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: Socio-economic and environmental 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 The learner uses mathematical skills to draw a pie chart showing the percentage composition of components of air. .

Suggested Assessment Rubric

Level / Indicators	Exceeds Expectations	Meets Expectations	Approaches Expectations	Below expectations
Ability to identify the changes of state when substances are heated or cooled.	The learner identifies the changes of state when substances are heated or cooled exhaustively.	The learner identifies at least four changes of state when substances are heated or cooled.	The learner identifies at least two changes of state when substances are heated or cooled.	The learner identifies less than two changes of state when substances are heated or cooled.
Ability to identify the components of air.	The learner identifies the major components of air exhaustively.	The learner identifies the four major components of air.	The learner identifies at least two major components of air.	The learner correctly identifies less than two major component of air.

Ability to explain the effects of air pollution to the environment.	The learner explains effects of air pollution to the environment in detail comprehensively.	The learner explains all the common effects of air pollution to the environment.	The learner explains most of the effects of air pollution to the environment.	The learner explains a few effects of air pollution to the environment.

STRAND 3.0 FORCE AND ENERGY

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question (s)
3.0 Force and energy	**3.1 Light** (16 lessons) ● *Movement of light through materials* ● *Ray diagrams of images in plane mirrors* ● *Formation of shadows and eclipses* ● *Reflection of light at plane surfaces* ● *Image formation in plane mirrors* ● *Rainbow formation*	By the end of the sub strand, the learner should be able to; a) demonstrate the movement of light through materials, b) draw ray diagrams of images formed on plane mirrors, c) illustrate the formation of shadows and eclipses in nature, d) describe the formation of rainbow in nature, e) Appreciate the importance of movement light in everyday life.	The learner is guided to: ● Carry out activities in purposive pairs/ groups to show the movement on light through different materials. *(Transparent, translucent and opaque).* Learners with manipulation difficulties could use alternative functional parts of the body, given physical support by peers/learner support assistant to carry out the activity. Learners with postural difficulties could have tables or worktops heights appropriately adjusted. ● Perform an experiment in purposive groups to show reflection of light on plane mirrors *(laws of reflection).* Learners with postural difficulties could have tables or worktops heights appropriately adjusted. ● Locate and illustrate images formed on plane mirrors and	How does light travel?

			discuss their characteristics. Learners with manipulation difficulties could use alternative functional parts of the body, given physical support by peers/learner support assistant to carry out the activity. ● Carry out activities to demonstrate and illustrate the formation of shadows and eclipses *(solar & lunar eclipses).* ● 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 rainbow in nature. ● Discuss in purposive groups the applications of movement of light through different media *(mirrors, periscope, kaleidoscope, lenses, magnifying glass, hand lens, mirage, rainbow).* Learners with speech difficulties could use residual speech/ digital devices with text-to-speech application/	

			point/sign/write/type during the discussion. **Project:** Learner uses locally available resources to make a functional periscope.	

Core competencies to be developed:

- Digital literacy: The learner interacts with digital technology as they use digital or print media to search for information on the movement of light through materials, image formation 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.

Values:

Unity: The learner works harmoniously with peers as they use locally available resources to make a functional periscope.

Pertinent and Contemporary Issues:

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.

Links to other Learning areas:

The learner is able to relate the concept of ray of light in lighting up the home in Home Science.

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) ● *Examples of*	By the end of the sub strand, the learner should be able to: a) identify common levers used in day to day life,	The learner is guided to: ● Brainstorm in purposive pairs the meaning of levers as simple machines. Learners	How are levers used in our everyday life?

	levers ● *Parts of levers* ● *Classification of levers* ● *uses of levers in day to day life*	b) describe parts of a lever as used in making work easier, c) classify levers into the three classes, d) demonstrate the use of levers in making work easier, e) appreciate the use of levers in making work easier.	with speech difficulties could use Alternative modes of Communication to express their views during discussion. ● Work collaboratively to identify parts of a lever *(fulcrum/pivot, effort, and load).* ● Carry out activities to group levers into the three classes *(first, second and third class levers).*Learners with manipulation difficulties could use alternative functional parts of the body, given physical support by peers/learner support assistant to carry out the activity. ● Carry out activities to demonstrate the use of common levers as simple machines, *(a hole punch, pliers, scissors, a see-saw, wheelbarrow, bottle openers, nail clippers, a nutcracker, shovel, fishing rod, kitchen tongs and tweezers.)* Use digital or print media to	

			search for information on how levers make work easier in day to day life. *Adjust light/ glare on the screens of the digital devices appropriately for learners who are sensitive to light.* **Project**: Learners are guided to make and use a beam balance from locally available materials.	

Core competencies to be developed

- Creativity and imagination: The learner assembles different parts and innovatively makes a beam balance from locally available materials.
- Learning to learn**:** The learner learn from each other as they carry out activities as they 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:

- Learner is able to link application of the principle of levers in farm tools, use of cutlery; spoons and bottle openers as in Agriculture and Nutrition.
- Learner is able to apply the concepts of simple leavers as they play on a seesaw in creative Arts.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
3.0 Force and energy	**3.3 Slopes as simple machines** (14 lessons) ● Types of slopes ● Uses of slopes	By the end of the sub strand, the learner should be able to; a) identify types of slopes used as simple machines, b) demonstrate how a slope makes work easier in day to day life, c) appreciate the use of slopes in everyday life.	The learner is guided to: ● Discuss in purposive groups the meaning of slope as a simple machine *(inclined plane).* Learners with speech difficulties could use alternative modes of communication to express their views during discussion. ● Give practical examples on where slopes are used to make work easier around the school environment *(ladders, ramps, staircase, road winding up-hill, wedge, roofs, loading a lorry*), learners with speech difficulties could be given extra time to express themselves. ● Discuss in purposive groups how slopes are used to make work easier in day to day life.	How are slopes used in everyday life?

			• Carry out activities to show how slopes make work easier. Learners with mobility difficulties could be given physical support by peers, learner support assistant or teacher as they carry out the activities. • Where possible, use digital media to search for information on how slopes make work easier *(elevators/lifts, escalators/moving stares, stair case, ladders, cableways, ramps, road winding up-hill, wedge, roofs, loading a lorry).*Learners with mobility difficulties could be given physical support by peers, learner support assistant or teacher as they carry out the activities. • Discuss the importance of use of slopes in day to day life.	

			Project: Make a simple slope for use in school or at home using locally available materials. Learners with manipulation or fine motor difficulties could be assisted by peers or teacher aide as they carry out this activity.	

Core competencies to be developed:

- Citizenship: The learner exercises ethical responsibility as they make a simple slope for use in school or at home using locally available materials.
- Critical thinking and problem solving**:** The learner thinks clearly as they make a simple slope for use in school or at home using locally available materials.

Values:

Integrity: The learner learns how to utilise resources prudently while making a simple slope for use in school or at home.

Pertinent and Contemporary Issues:

Socio economic issues: The learner exercises safety and security as they carry out activities to show how slopes make work easier.

Links to other Learning areas:

The learner is able to relate the concept of slope in the use of farm tools, equipment and machinery to carry out the projects in Agriculture and Nutrition.

Suggested Assessment Rubric

Level / Indicator	Exceeds Expectations	Meets Expectations	Approaches Expectations	Below expectations
Ability to illustrate the formation of shadows and eclipses in nature.	The learner illustrates the formation of shadows and eclipses in nature correctly and labels.	The learner illustrates the formation of shadows and eclipses in nature correctly.	The learner illustrates the formation of shadows and eclipses in nature omitting some basic details.	The learner illustrates the formation of shadows or eclipses in nature with minor details.
Ability to demonstrate the use of levers to make work easier.	The learner demonstrates the use of levers to make work easier innovatively.	The learner demonstrates the use of levers to make work easier.	The learner partially demonstrates the use of levers to make work easier.	The learner too partially demonstrates the use of levers to make work easier, omitting some process.
Ability to demonstrate how a slope makes work easier in day to day life.	The learner innovatively demonstrates how a slope makes work easier in day to day life giving illustrations.	The learner demonstrates how a slope makes work easier in day to day life.	The learner partially demonstrates how a slope makes work easier in day to day life.	The learner partially demonstrates how a slope makes work easier in day to day life omitting some stages.

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 ●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** ●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
● Reflections ● Game Playing ● Pre-Post Testing ● Model Making ● Explorations ● Experiments ● Investigations ● Conventions, Conferences and Debates ● Applications ● Teacher Observations ● Project ● Journals ● Portfolio ● Oral or Aural Questions ● Learner's Profile ● Written Tests ● Anecdotal Records	● Laboratory Apparatus and Equipment ● Textbooks ● Speech to text and text to speech software ● Relevant reading materials ● Digital/ adapted digital Devices ● Recordings	● Visit the science historical sites. ● Use digital devices 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.

NOTE: Assessment methods may be modified to accommodate a learner's diverse needs so that he/she can participate and achieve the learning outcomes. The table below shows how modes of assessment may be adapted for learners with physical impairment:

S/No	Assessment Methods/Modes And Suggested Adaptations	
	Methods	**Suggested Adaptations**
1.	Written assessment	• Typing, stamping or signing • Description of the task as a scribe or learner support assistant writes Audio visual recording of the learner as he/she makes oral responses • Provision of Adapted digital devices and writing/drawing resources • Adjustment of time according to individual needs • Providing illustrations to be interpreted for activities that involve drawing • Use of worksheets
2.	Oral or Aural assessment	• Written responses • Use of AAC (*Augmentative and Alternative modes of Communication) e.g. talking books, gestures, body movement, sign language, alphabet cards, facial expressions* • Adjustment of time according to individual needs
3.	Portfolio	• Use of E-Portfolio • Provision of physical support • Use of assistive technology • Provision of Adapted digital devices and writing/drawing resources • Adjustment of time according to individual needs • Description of how to carry out a practical activity while being audio/video recorded
4.	Practical assessment/ Experiments	• Provision of physical support • Provision of Adapted resources (learner specific) • Description of how to carry out a practical activity while being audio/video recorded

		• Adjustment of time according to individual needs • Rest intervals according to individual needs • Environmental adaptation
5.	Project	• Provision of physical support • Provision of Adapted resources (learner specific) • Description of how to carry out a practical activity while being audio/video recorded • Adjustment of time according to individual needs • Environmental adaptation

Note: Safety of all learners should be observed during assessment