REPUBLIC OF KENYA
MINISTRY OF EDUCATION

JUNIOR SCHOOL CURRICULUM DESIGN

INTEGRATED SCIENCE

GRADE 8

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 eight curriculum designs for learners with visual impairment build on competencies attained by learners at Grade 7. Emphasis at this grade is the development of skills for exploration and making informed decision on pathways based on careers.

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 seven is the first grade of Junior school while Grade 9 is the final grade of the level in the reformed education structure.

The reviewed Grade eight curriculum furthers implementation of the CBC from Grade seven. 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 eight 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 eight and prepare them for smooth transition to Grade nine. 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 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 eight 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 panelists; the Semi-Autonomous Government Agencies (SAGAs) and representatives of various stakeholders for their roles in the development and adaptation of the Grade eight 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 eight and preparation of learners with visual impairment for transition to Grade nine.

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NATIONAL GOALS OF EDUCATION

Education in Kenya should:

1. **Foster nationalism and patriotism and promote national unity.**

   Kenya's people belong to different communities, races and religions, but these differences need not divide them. They must be able to live and interact as Kenyans. It is a paramount duty of education to help young people acquire this sense of nationhood by removing conflicts and promoting positive attitudes of mutual respect which enable them to live together in harmony and foster patriotism in order to make a positive contribution to the life of the nation.

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

   Education should prepare the youth of the country to play an effective and productive role in the life of the nation.

   a. **Social Needs**
      Education in Kenya must prepare children for changes in attitudes and relationships which are necessary for the smooth progress of a rapidly developing modern economy. There is bound to be a silent social revolution following in the wake of rapid modernization. Education should assist our youth to adapt to this change.

   b. **Economic Needs**
      Education in Kenya should produce citizens with the skills, knowledge, expertise and personal qualities that are required to support a growing economy. Kenya is building up a modern and independent economy which is in need of an adequate and relevant domestic workforce.

   c. **Technological and Industrial Needs**
      Education in Kenya should provide learners with the necessary skills and attitudes for industrial development. Kenya recognizes the rapid industrial and technological changes taking place, especially in the developed world. We can only be part of this development if our education system is deliberately focused on the knowledge, skills and attitudes that will prepare our young people for these changing global trends.

3. Promote individual development and self-fulfillment

Education should provide opportunities for the fullest development of individual talents and personality. It should help children to develop their potential interests and abilities. A vital aspect of individual development is the building of character.

4. Promote sound moral and religious values.

Education should provide for the development of knowledge, skills and attitudes that will enhance the acquisition of sound moral values and help children to grow up into self-disciplined, self-reliant and integrated citizens.

5. Promote social equality and responsibility.

Education should promote social equality and foster a sense of social responsibility within an education system which provides equal educational opportunities for all. It should give all children varied and challenging opportunities for collective activities and corporate social service irrespective of gender, ability or geographical environment.

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

Education should instill in the youth of Kenya an understanding of past and present cultures and their valid place in contemporary society. Children should be able to blend the best of traditional values with the changing requirements that must follow rapid development in order to build a stable and modern society.

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

Kenya is part of the international community. It is part of the complicated and interdependent network of peoples and nations. Education should therefore lead the youth of the country to accept membership of this international community with all the obligations and responsibilities, rights and benefits that this membership entails.

8. Promote positive attitudes towards good health and environmental protection.

Education should inculcate in young people the value of good health in order for them to avoid indulging in activities that will lead to physical or mental ill health. It should foster positive attitudes towards environmental development and conservation. It should lead the youth of Kenya to appreciate the need for a healthy environment.

LESSON ALLOCATION FOR JUNIOR SCHOOL

S/ No.	Learning Area	Lesson
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	4
5.	Integrated Science for Learners with Visual Impairment	5
6.	Agriculture & Nutrition for Learners with Visual Impairment	4
7.	Social Studies for Learners with Visual Impairment	4
8.	Creative Arts and sports for Learners with Visual Impairment	5
9	Pre- technical Studies for learners with Visual Impairment	4
10.	Pastoral/ Religious Instruction Programme	1
	Total	**41**

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

LEARNING OUTCOMES FOR MIDDLE SCHOOL

By end of Middle School, the learner should be able to:

1. Apply literacy, numeracy and logical thinking skills for appropriate self-expression.
2. Communicate effectively, verbally and non-verbally, in diverse contexts.
3. Demonstrate social skills, and spiritual and moral values for peaceful co-existence.
4. Explore, manipulate, manage and conserve the environment effectively for learning and sustainable development.
5. Practise relevant hygiene, sanitation and nutrition skills to promote health.
6. Demonstrate ethical behaviour and exhibit good citizenship as a civic responsibility.
7. Appreciate the country's rich and diverse cultural heritage for harmonious co-existence.
8. Manage pertinent and contemporary issues in society effectively.
9. Apply digital literacy skills for communication and learning.

ESSENCE STATEMENT

Integrated Science is a new learning area that enables learners to apply distinctive ways of logical valuing, thinking and working to understand natural phenomena in the biological, physical and technological world. The learning area is expected to create a scientific culture that inculcates scientific literacy to enable learners with visual impairment to make informed choices in their personal lives and approach life challenges in a systematic and logical manner. The inclusion of Integrated Science is therefore a deliberate effort to enhance the level of scientific literacy of learners with visual impairment and equip them with the relevant basic integrated scientific knowledge, skills, values and attitudes needed for career development, employment and independent living. Concepts in Integrated Science are presented as units within which there are specific strands that build on the competencies acquired in Science and Technology at Upper Primary level. The emphasis of science education at lower secondary levels is to enhance learners' scientific thinking through learning activities that involve the basic science process skills.

Learners with visual impairment, particularly those with blindness have not been learning certain concepts in science especially those related to chemistry and physics due to lack of science educational resources and instructional methods that have been appropriately adapted to make science accessible to these categories of learners. In view of this, integrated science in Junior School has been adapted to provide multisensory experimental approaches that are crucial in helping learners with blindness to gain more purposeful, independent, and hands-on laboratory experience. Appropriate apparatus, equipment, materials, assistive technology as well as suitable experiences have been suggested to make learning in this subject accommodative and interesting to learners with visual impairment. Learners with low vision need enhancement in terms of materials and learning environment to address the limitations of sight that may hinder effective learning of integrated science.

Integrated Science provides the learner with visual impairment with the basic requisite skills, knowledge, values and attitudes necessary for specialization in the STEM pathway at senior school level. The rationale for inclusion of Integrated Science is anchored on the Kenya Vision 2030, Sessional Papers No. 14 of 2012, and No. 1 of 2019, which all underscore the importance of science, technology and innovation in education and training.

Integrated Science is taught through inquiry-based learning approaches with emphasis on the 5Es: engagement, exploration, explanation, elaboration and evaluation.

SUBJECT GENERAL LEARNING OUTCOMES

By the end of Junior School, the learner should be able to:

1. Acquire sufficient scientific knowledge, skills, values and attitudes to make informed choices on career pathways at Senior School and for everyday use, further education and training.
2. Select, improvise and safely use basic scientific apparatus, materials and chemicals effectively in everyday life.
3. Explore, manipulate, manage and conserve the environment for learning and sustainable development.
4. Practise relevant hygiene, sanitation and nutrition skills to promote good health.
5. Apply the understanding of body systems with a view to promoting and maintaining good health.
6. Develop capacity for scientific inquiry and problem solving in different situations.
7. Appreciate and use scientific principles and knowledge in everyday life.
8. Apply acquired scientific skills and knowledge to construct appropriate scientific devices from available resources.

SUMMARY OF STRANDS AND SUB STRANDS

Strands	Sub Strands	Suggested Number of Lessons
1.0 Mixtures, Elements and Compounds	1.1 Elements and Compounds	18
	1.2 Physical and chemical changes	22
	1.3 Classes of fire	20
2.0 Living things and the Environment	2.1 The Cell	20
	2.2 Movement of materials in and out of the cell	16
	2.3 Reproduction in human beings	18
3.0 Force and Energy	3.1. Transformation of Energy	20
	3.2. Pressure	16
Total Number of Lessons		**150**

Note
The suggested number of lessons per sub strand may be less or more depending on the context.

STRAND 1.0: MIXTURES, ELEMENTS AND COMPOUNDS

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
1.0 Mixtures, Elements and Compounds	**1.1 Elements and Compounds (18 lessons)** • *Atoms, elements, molecules and compounds,* • *Symbols of common elements (oxygen, carbon, hydrogen, nitrogen, iron, aluminium, copper, silver, gold, chlorine, sodium, mercury, lead),* • *Word equations for reactions of elements to form compounds (sodium chloride, water, carbon dioxide,*	By the end of the sub strand, the learner should be able to: a) explain the relationship between an atom, an element, a molecule and a compound, b) assign symbols to selected elements, c) write word equation to represent reactions of selected elements to form compounds *(for learners with low vision),* d) write braille representation of word equations to represent reactions of selected elements to form compounds *(for*	• In groups, learners discuss the meaning of atoms, elements, molecules and compounds. • Learners are guided to use digital devices with assistive technology, print or braille media to search for the relationship between an atom, an element, a molecule and a compound or observe or listen to simulation of atoms, elements, molecules and compounds. • Learners are guided to sample labelled containers of different substances identify and record the elements or compounds on containers. Learners with blindness are guided to assemble containers labelled in braille to identify and record the elements and compounds and are also given verbal description of labels on containers. • Learners are guided to represent selected elements using symbols in print or braille.	Why is it important to use symbols for representing elements in day-to day life?

	copper oxide, aluminium oxide), • *Uses of some common elements in the society (jewellery, construction, electricity, food nutrients, minerals elements, medals.*	*learners with blindness),* e) outline the applications of common elements in the society, f) appreciate the information on packaging labels of commonly consumed substances.	• Learners with blindness are guided to read braille representation of word equations. • Learners with blindness are guided to write word equations in braille. • Learners are guided to use word equations to represent reactions of selected elements to form compounds. • Learners are guided to identify elements in selected compounds with only two elements. • Learners are guided to explore the importance of common elements and compounds in day-to-day life.	

Core competencies to be developed:

- **Learning to learn**: The learner reflects on their own experiences as they identify elements and compounds on labels of containers.
- **Communication and collaboration:** The learner writes clearly and correctly the symbols of elements, compounds and word equations.

Values:

- **Unity**: The learner cooperates with others to identify elements and compounds from sample labelled containers of different substances.
- **Integrity**: The learner portrays honesty as they work out word equations to represent reactions of selected elements to form compounds.

Pertinent and Contemporary Issues (PCIs):

- **Financial literacy**: The learner explores the value of common elements and compounds in society as they learn about importance and value of common elements and compounds in day-to-day life.

Links to other subjects:

- **Agriculture and Nutrition**: The learner is able to relate the use of ingredients and items made from the common elements and compounds learnt.

Suggested Learning Resources:

Digital devices with assistive technology such as adapted keyboard, screen readers and screen magnifiers, containers of different products labelled in print and braille, braille card, print materials in appropriate font and colour contrast, braille materials and equipment.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
1.0. Mixtures, Elements and Compounds	**1.2 Physical and chemical changes** **(22 lessons)** ● *Kinetic theory of matter,* ● *Heating curve,* ● *Effects of impurities on boiling point and melting point,* ● *Physical and chemical changes (both temporary and permanent changes),*	By the end of the sub strand, the learner should be able to: a) describe the characteristics of particles in the three states of matter, b) explain the effects of impurities on boiling point and melting point of a substance, c) distinguish between temporary and permanent changes in substances, d) outline applications of change of state of matter in day-to-day life, e) appreciate the applications of change of state of matter in day-to-day life.	• Learners are guided to carry out activities to demonstrate the characteristics of particles in the three states of matter, (*kinetic theory of matter).* Learners with blindness are guided to assemble materials for the experiment and are supported to experience some of the characteristics such as liquid flowing and compressing gases in a syringe. • Learners are guided to use digital devices with assistive technology, print or braille media to play and observe or listen to videos and animations showing movement of particles in the different states of matter. • Learners with low vision perform experiments to demonstrate diffusion in liquids using water and ink to illustrate kinetic theory of matter. Learners with blindness are given one on one demonstration and verbal descriptions on how ink will spread in the container uniformly. • Learners are guided carry out simple experiments to determine the boiling and	How does the movement of particles in matter affect its physical properties?

	• *Applications of physical and chemical changes in day to day life.*		melting points of pure and impure substances. Learners with blindness are supported when heating substances and noting the boiling and melting point of substances. ***Precaution:*** *maintain safe distance from the source of heat.* • Learners with low vision draw the heating curve and discuss the trends while learners with blindness are guided to manipulate and interpret the tactile heating curve and discuss the trends. • In groups, learners discuss the effects of impurities on boiling point and melting point of a substance. • Learners are guided to carry out simple experiments to demonstrate physical and chemical changes in substances. Learners with blindness are guided to feel some changes such as the melting of ice and rust on iron. Where not possible, learners are given verbal description on observations made during the changes. • In groups, learners discuss the applications of physical and chemical changes in day-to-day life.	

Core competencies to be developed: ● **Critical thinking and problem solving**: The learner uses logical reasoning while discussing the characteristics of particles in the three states of matter. ● **Digital literacy**: The learner uses digital devices with assistive technology to play and observe or listen to videos and animations showing movement of particles in the different states of matter.				
Values: ● **Unity**: The learner cooperates with peers as they carry out simple experiments to determine the boiling and melting points of pure and impure substances. ● **Responsibility**: The learner observes safety precautions as they carry out simple experiments to determine the boiling and melting points of pure and impure substances.				
Pertinent and Contemporary Issues (PCIs): ● **Disaster risk reduction**: The learner observes safety while carrying out simple experiments to determine the boiling and melting points of pure and impure substances with peers.				
Links to other subjects: ● **Agriculture and Nutrition**: The learner relates concept of change of state of matter to preserves food.				
Suggested Learning Resources: Digital devices with assistive technology such as adapted keyboard, screen readers and screen magnifiers, print materials in appropriate font and colour contrast, braille materials and equipment, water, ink, source of heat, thermometer, Adapted laboratory apparatus and equipment.				

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
1.0 Mixtures, Elements and Compounds	**1.3 Classes of fire** **(20 Lessons)** ● *Causes of fire (classes of fire),* ● *Fire triangle and Fire control (breaking the fire triangle and use of fire extinguishers),* ● *Dangers of fires.*	By the end of the sub strand, the learner should be able to: a) identify causes of fire in nature, b) explain the role of the components of fire triangle in the spread of fire, c) describe ways of controlling different classes of fires, d) acknowledge the dangers of fires in nature.	● In groups, learners discuss the possible causes of fire in nature. ● Learners are guided to discuss the role of the fire triangle in the spread of fire. Learners with blindness are given a tactile diagram of fire triangle to identify the arrangements of components of fire triangle. ● Learners are guided to search for information from the internet and other sources on the different classes of fire. ● Learners are guided to discuss the dangers of fires in the environment. ● Learners are guided to practise fire control measures. Learners with blindness are guided to manipulate a fire extinguisher to identify its parts and are guided on how to use it. The learners are also orientated on how to break fire triangle. ● Learners are guided to discuss rights to safety and access to information on flammable substances. ● Learners are guided to use available digital, print or braille media to search for fire control measures.	Why is fire dangerous?

			Project Learners are guided to prepare tactile or print posters on classes of fires and their control measures and hang at school, home and neighbouring markets.	

Core competencies to be developed:

- **Citizenship**: The learner enhances active community life skills by making posters on classes of fires and their control measures and hanging them at school, home and neighbouring markets.
- **Communication and collaboration**: The learner acquires listening, speaking and recording skills as they discuss the causes of fire, dangers of fire and rights to safety.

Values:

- **Respect:** The learner observes rules of engagement while working with peers in groups to classify fire according to the cause and suggest control measures.
- **Responsibility**: The learner observes safety precautions when dealing with fires and flammable materials.

Pertinent and Contemporary Issues (PCIs):

• **Safety and security**: The learner learns how to take care of self and others when handling fire as the learner discusses the dangers of fires in the environment.
Links to other subjects: • **Social studies:** The learner practices safety measures to prevent fire accidents in nature as a life skill.
Suggested Learning Resources: Fire extinguisher, digital devices with assistive technology such as adapted keyboard, screen readers and screen magnifiers, print materials in appropriate font and colour contrast, braille materials and equipment.

Suggested Assessment Rubric				
Level **Indicator**	**Exceeds expectation**	**Meets expectation**	**Approaches expectation**	**Below expectation**
Ability to: • Explain the relationship between an atom, an element, a molecule and a compound. • Assign symbols to selected elements. • Distinguish between temporary and permanent changes in substances. • Describe ways of controlling fires in nature.	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: LIVING THINGS AND THEIR ENVIRONMENT

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
2.0 Living Things and their Environment	**2.1 The Cell** **(20 lessons)** • *Definition of the term 'cell',* • *Cell structure as seen under a light microscope (plant and animal cells),* • *Preparation of temporary slides of plant cells,* • *magnification of cells seen under the light microscope.*	By the end of the sub strand, the learner should be able to: a) describe the structure of plant and animal cell as observed under a light microscope, b) describe the functions of components of a cell as seen under the light microscope, c) compare plant and animal cells as observed under a light microscope, d) determine the magnification of cells seen under the light microscope, e) appreciate the role of cells in living things.	• Learners with low vision are guided to prepare, mount, observe and draw plant cells as seen under a light microscope. ***Hint:*** *Learners with low vision use eyepiece lens and objective lens with high magnification power.* • Learners with blindness are given verbal descriptions of the steps of preparing, mounting and examining the specimen. Learners with blindness to manipulate models and tactile diagrams of plant cells as seen under light microscope and identify its components. • Learners with low vision are guided to observe permanent slides of animal cells under the light microscope and identify the components of animal cell. ***Hint:*** *Learners with low vision use eyepiece lens and objective*	How do plant and animal cells differ?

			lens with high magnification power. • Learners with blindness are provided with models and tactile diagrams of animal cells to manipulate and identify the components of animal cells seen under light microscope. • Learners are guided to use print, non-print or braille material to search for information on functions of components of plant and animal cells as seen under the light microscope. • In groups, learners discuss the similarities and differences between plant and animal cells as seen under a light microscope. • Learners are guided calculate magnification at various objective lenses of the light microscope.	

Core competencies to be developed:

- **Critical thinking and problem solving**: The learner follows instruction while preparing, mounting and observing plant cells under a light microscope.
- **Self-efficacy**: The learner successfully prepares and observes specimens under the light microscope and manipulates a model and tactile diagram of an animal cell.

Values:

- **Unity:** The learner displays team spirit as they prepare, mount, observe and draw plant cells as seen under a light microscope.
- **Responsibility:** The learner performs assigned roles as they prepare, mount, observe and draw plant cells as seen under a light microscope.

Pertinent and Contemporary Issues (PCIs):

- **Environmental education and climate change**: The learner safely disposes off waste materials generated from experiments on the study of cells.

Links to other subjects:

Mathematics: The learner carries out multiplication of objective lens and eye piece lens to get the magnification.

Suggested Learning Resources:

Light microscope, permanent slides of animal cells, plant cells, models and tactile diagrams of plant and animal cells, digital devices with assistive technology such as adapted keyboard, screen readers and screen magnifiers, print materials in appropriate font and colour contrast, braille materials and equipment.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
2.0 Living Things and their Environment	**2.2 Movement of materials in and out of the cell** **(16 lessons)** • *Diffusion and Osmosis,* • *Demonstration of diffusion and osmosis,* • *Role of diffusion and osmosis in living things (Absorption of water, nutrients in the intestines, gases in the lungs).*	By the end of the sub strand, the learner should be able to; a) outline process of diffusion and osmosis in cells, b) demonstrate diffusion and osmosis in living things, c) explain the role of diffusion and osmosis in living things, d) appreciate the importance of diffusion and osmosis in living things.	• Learners are guided to use print, braille or non-print material to search for information on the processes involved in movement of materials in and out of a cell. • Learners are guided to demonstrate diffusion of materials in plant materials and share their findings with peers. Learners with blindness are orientated to carry out the experiment and are given verbal description on the expected observation. Where possible, the learners to manipulate the specimen before and after experiment. • Learners are guided to set-up experiments to demonstrate osmosis using visking tubing and plant materials and share their findings. Learners with	How do materials move in and out of a cell?

			blindness are given one on one demonstration on how to set up the experiment and are guided to manipulate the plant materials and visking tubing before and after the experiment to feel the changes. ● Learners are guided to search for information from print, braille or non-print media to search for information on the roles of diffusion and osmosis in living things and discuss with peers.	

Core competencies to be developed:

- **Communication and collaboration:** The learner acquires writing skills as while recording findings from experiments to demonstrate diffusion and osmosis.
- **Self-efficacy:** The learner executes assigned tasks successfully while carrying out experiments to demonstrate diffusion and osmosis.

Values:

- **Respect:** The learner appreciates the opinions of peers when discussing the roles of diffusion and osmosis in living things.
- **Responsibility**: The learner plays assigned roles while carrying out experiments to demonstrate semi-permeability of the cell membrane.

Pertinent and Contemporary Issues (PCIs):

- **Environmental education and climate change**: The learner learns how to disposes of waste materials from experiments to demonstrate diffusion and osmosis appropriately.

Links to other subjects:

Agriculture and Nutrition: The learner links the information on diffusion and osmosis to absorption of water and mineral salts from the soil by crops.

Suggested Learning Resources:

Visking tubing, solutions of different concentration and plant tubers such as potato, digital devices with assistive technology such as adapted keyboard, screen readers and screen magnifiers, print materials in appropriate font and colour contrast, braille materials and equipment.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
2.0 **Living things and their Environment**	**2.3 Reproduction in human beings** **(18 Lessons)** • *The menstrual cycle in human beings (omit details of hormonal control),* • *Challenges related to the menstrual cycle (include irregular periods, irregular bleeding, and pain),* • *Process of fertilisation and implantation (cover fusion of sperm with the egg and implantation of blastocyst in the uterus),*	By the end of the sub strand the learner should be able to: a) outline the menstrual cycle and its related challenges in human beings, b) develop a plan to manage challenges related to menstrual cycle in human beings, c) describe fertilisation and implantation in human beings, d) outline symptoms STIs in human beings,	• Learners search for information from print, braille or non-print media on the menstrual cycle and discuss with peers. • Learners search for information from print, braille or non-print media on challenges related to the menstrual cycle and discuss with peers. • In groups, learners discuss management of challenges related to the menstrual cycle and make presentations.	How can challenges related to the menstrual cycle be managed?

	• ***Note:*** *-details on formation of blastocyst not necessary* *Symptoms and prevention of common STIs (HIV& Aids, Gonorrhea, Syphilis, Herpes - Avoid details of causative agent)*	e) Explain prevention measures for common STIs in human beings, f) appreciate the need for a healthy reproductive system. .	• Learners with low vision study illustrations/charts on fertilisation and implantation. Learners with blindness are given verbal description of the process of fertilization and implantation. • Learners search for information from print, braille or non-print materials on symptoms of common STIs and their prevention and make presentation.	

Core competencies to be developed:

- **Learning to learn:** The learner organises own learning while searching for information from print, braille or non-print materials on symptoms of common STIs and their prevention.
- **Self-efficacy:** The learner appreciates and successfully manages challenges related to the menstrual cycle.

Values:

- **Love:** The learner shows empathy and embraces those with menstrual challenges.
- **Respect**: The learner shows open mindedness while discussing symptoms of common STIs and their prevention.

Pertinent and Contemporary Issues (PCIs):

- **Health promotion issues**: The learner discusses challenges related to the menstrual cycle and prevention of common STIs.

Links to other learning areas:

- **Agriculture and Nutrition:** The information on common STIs is linked to communicable diseases.

Suggested Learning Resources:

Print and tactile charts on fertilisation and implantation, digital devices with assistive technology such as adapted keyboard, screen readers and screen magnifiers, print materials in appropriate font and colour contrast, braille materials and equipment.

Suggested Assessment Rubric

Level / Indicator	Exceeds expectation	Meets expectation	Approaches expectation	Below expectation
Ability to: • Describe the functions of components of a cell as seen under the light microscope. • Compare plant and animal cells as observed under light microscope. • Explain the role of diffusion and osmosis in living things • Outline the menstrual cycle and its related challenges in human beings. • Develop a plan to manage challenges related to the menstrual cycle in human beings.	The learner demonstrates five skills.	The learner demonstrates four skills.	The learner demonstrates 2-3 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 Transformation of energy** **(20 lessons)** • *Forms of energy in nature,* • *Renewable and non-renewable energy sources,* • *Energy transformations in nature,* • *Safety measures associated with energy transformation ,*	By the end of the sub strand, the learner should be able to: a) identify forms of energy in nature, b) classify energy sources into renewable and non-renewable, c) demonstrate simple energy transformations in nature, d) describe safety measures associated with energy transformation, e) appreciate the applications of energy transformation in day-to- day life.	• In groups, learners discuss and identify forms of energy found in nature which include light, heat, potential, kinetic, gravitational, electrical energy, sound energy, chemical energy, nuclear or atomic energy. • In pairs, learners discuss and classify energy sources in nature as renewable, clean or green energy and non-renewable sources. • Learners use digital devices with assistive technology, print or braille media to search for information on classification of energy sources in nature and make presentations. • Learners with low vision are guided to demonstrate the processes of energy transformation in day-to-day life using charts in appropriate font and colour contrast. Learners with blindness are given verbal description on the transformations of energy and guided to interpret tactile charts of energy transformation. *(electrical to heat,*	1. How is energy transformed? 2. How is energy transformation applied in day-to-day life?

	• *Applications of energy transformation in day-to- day life.*		*chemical to electrical, mechanical to electrical, electrical to light, electrical to sound and potential to kinetic).* ● Learners are guided to discuss applications of energy transformations processes in day to day life *(use of a falling object, rubbing both hands, burning of wood, electric bulbs, Light Emitting Diodes (LED), electric heater, steam engine, piezoelectricity, microphone, windmills, electric generator/dynamo, hydroelectric dams, thermocouple, geothermal power plant, solar panel, electric motor).* ● Learners are guided to use digital devices with assistive technology, print or braille materials to search for information on the applications of energy transformations in day to day life. ● Learners are guided to discuss safety measures on energy transformation and mitigation strategies *(relate to road accidents; K.E to P.E; action and reaction, accidents caused by fire, electricity, health hazard from bright light, loud sound).* ● Learners are guided to use digital, braille or print media to search for information on safety measures on energy transformation and mitigation strategies.	

Core competencies to be developed:

- **Critical thinking and problem solving**: The learner explores problems and creates different solutions as they discuss examples and applications of energy transformations processes in day-to-day life using solar energy.
- **Creativity and imagination**: The learner experiments with ideas to test workability as they demonstrate the processes of energy transformation in day-to-day life.

Values:

- **Social justice**: The learner play leadership role and delegate duties as carry out activities to show energy transformation in day-to-day life.
- **Love:** The learner cares for others as they demonstrate the processes of energy transformation in day-to-day life in groups.

Pertinent and Contemporary Issues (PCIs):

- **Citizenship**: The learner exercises civic responsibility as they use digital with assistive technology, braille or print media to search for information on safety measures associated with energy transformation and strategies of mitigating them.

Links to other subjects:

- **Agriculture and Nutrition**: The learner relates the concept of energy transformation to cooking processes.

Suggested Learning Resources:

Print and tactile charts on energy transformation, print materials in appropriate font and colour contrast, braille materials and equipment, digital devices with assistive technology such as adapted keyboard, screen readers and screen magnifiers.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
3.0 Force and Energy	**3.2 Pressure** **(16 lessons)** • *Pressure in solids and liquids,* • *Applications of pressure in solids and liquids.*	By the end of the sub strand, the learner should be able to: a) define pressure as used in science, b) carry out experiment to demonstrate pressure in solids and liquids, c) identify applications of pressure in solids and liquids, d) appreciate the applications of pressure in solids and liquids.	• Learners are guided to use digital devices with assistive technology, print or non-print media to search for and discuss the meaning of pressure. • Learners are guided to carry out activities to demonstrate pressure exerted by solids with different surface areas such as sharp and blunt cutting surfaces, stiletto shoes, flat soled shoes, bricks on different surfaces and construction of water dams. Learners with blindness are guided to manipulate the available objects and experience the pressure the objects exert on surface. • Learners are guided to carry out activities to determine pressure in liquids. Learners with blindness are guided to manipulate the container used in the experiment so as to identify depth of holes and then are given verbal description as they feel how water jets out from each hole. • In pairs, learners are guided to discuss the	1. Why is pressure important in day-to-day life? 2. How is pressure determined in solids and liquids?

			relationship between pressure, area of contact and weight of solids. ● Learners are guided to describe the relationship between pressure and heights of liquids.Learners with blindness are guided to feel water jetting out of different holes in a container at different depth and relate the pressure to depth. ● Learners are guided discuss the applications of pressure in solids and liquids. ● Learners are guided to use digital devices with assistive technology, print or braille media to search for information on applications of pressure in solids and liquids.	

Core competencies to be developed:

- **Communication and collaboration**: The learner acquires listening and speaking skills as they discuss the applications of pressure in solids and liquids.
- **Learning to Learn:** The learner uses digital with assistive technology, print or braille media to search for information on the applications of pressure in solids and liquids.

Values:

- **Unity**: The learner cooperates in using digital with assistive technology, print or braille media to search for and discuss with peers the meaning of pressure.
- **Integrity**: The learner follows laid down procedures in using appropriate materials in groups to demonstrate pressure in liquids

give fair results.

Pertinent and Contemporary Issues (PCIs):

Socio-economic issues: The learner learns how to reduce destructive effects of pressure on surfaces or objects as they carry out activities to demonstrate pressure exerted by solids.

Links to other subjects:

- **Mathematics**: The learner relates the concept of calculating pressure by relating weight of the contact surface area.
- **Pre-technical Studies**: The learner relates concepts of pressure in construction.

Suggested Learning Resources:

Water, bricks, digital devices with assistive technology such as adapted keyboard, screen readers and screen magnifiers, print materials in appropriate font and colour contrast, braille materials and equipment.

Suggested Assessment Rubric				
Level / **Indicator**	**Exceeds expectation**	**Meets expectation**	**Approaches expectation**	**Below expectation**
Ability to: • Identify forms of energy in nature. • Classify energy sources into renewable or non- renewable. • Demonstrate simple energy transformation in nature. • Demonstrate pressure in solids and liquids.	The leaner demonstrates four skills.	The leaner demonstrates three skills.	The leaner demonstrates two skills.	The leaner demonstrates one skill or none.

APPENDIX 1: GUIDELINES FOR INTEGRATING COMMUNITY SERVICE LEARNING (CSL) PROJECT

Introduction

Community Service Learning (CSL) is an experiential learning strategy that integrates classroom learning and community service to enable learners reflect, experience and learn from the community. The CSL activity is hosted as a strand in Social Studies. The Social Studies teacher will be expected to coordinate teachers from other learning areas to carry out the integrated CSL class activity. Learners will be expected to apply knowledge, skills, attitudes and values from the different Learning Areas to undertake the integrated CSL class activity. Learners will undertake **one common** integrated class CSL activity following a 6-step milestone approach that is:

Milestone	**Description**
Milestone 1	**Problem Identification** Learners study their community to understand the challenges faced and their effects on community members.
Milestone 2	**Designing a solution** Learners create an intervention to address the challenge identified.
Milestone 3	**Planning for the Project** Learners share roles, create a list of activities to be undertaken, mobilise resources needed to create their intervention and set timelines for execution
Milestone 4	**Implementation** The learners execute the project and keep evidence of work done.

Milestone 5	Showcasing /Exhibition and Report Writing Exhibitions involve showcasing learners' project items to the community and reflecting on the feedback Learners write a report detailing their project activities and learnings from feedback
Milestone 6	**Reflection** Learners review all project work to learn from the challenges faced. They link project work with academic concepts, noting how the concepts enabled them to do their project as well as how the project helped to deepen learning of the academic concepts.

Assessment of CSL integrated Activity

Assessment for the integrated CSL activity will be conducted formatively. The assessment will consider both the process and end product. This entails assessing each of the milestone stages of the integrated CSL class activity. It will focus on 3 components namely: skills

APPENDIX 2: 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 in print and braille ● Anecdotal Records	● Adapted Laboratory Apparatus and Equipment ● Print and braille course books ● Software ● Relevant reading materials ● Digital Devices with assistive technology ● Recordings	● Visit the science historical sites. ● Use digital devices with assistive technology to conduct scientific research. ● Organising 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 ● Organising and participating in exchange programmes. ● Making oral presentations and demonstrations on science issues.