

GENERAL SCIENCE

CURRICULUM FOR SECONDARY
EDUCATION (SHS 1 – 3)



NaCCA
NATIONAL COUNCIL FOR
CURRICULUM & ASSESSMENT
OF MINISTRY OF EDUCATION



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GENERAL SCIENCE CURRICULUM DEVELOPMENT PANEL

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SCOPE AND SEQUENCE

General Science Summary

S/N	STRAND	SUB-STRAND	YEAR 1			YEAR 2			YEAR 3		
			CS	LO	LI	CS	LO	LI	CS	LO	LI
1	Exploring Materials	Science and Materials in Nature	2	2	6	1	1	3	2	2	4
2	Processes For Living	Essentials for Survival	2	3	5	2	2	6	2	2	6
3	Vigour Behind Life	Powering the future with energy forms	1	1	2	1	1	2	1	1	2
		Forces acting on substances and mechanisms	1	1	2	1	1	1	1	1	2
		Consumer Electronics	1	1	1	1	1	2	1	1	2
4	Relationships With The Environment	The Human Body and Health	3	3	3	1	1	2	2	2	4
		Technology in our Local Industries	2	2	3	1	1	2	1	1	1
TOTAL			12	13	22	8	8	18	10	10	21

Overall Totals (SHS 1 – 3)

Content Standards (CS)	30
Learning Outcomes (LO)	31
Learning Indicators (LI)	61

YEAR ONE

Subject **GENERAL SCIENCE**
Strand **I. EXPLORING MATERIALS**
Sub-Strand **I. SCIENCE AND MATERIALS IN NATURE**

Learning Outcomes	21st-Century Skills and Competencies	GESI ¹ , SEL ² and Shared National Values
I.I.I.LO.I Evaluate the characteristics of science.	<p>Communication and Collaboration: Learners work in teams and groups to discuss and share ideas about the characteristics of science.</p> <p>Critical Thinking: Acknowledging the different opinions of different characteristics of science:</p> <ul style="list-style-type: none"> • Consider personal reactions to situations or problems and how these reactions may influence thinking. • Make simple modifications to known ideas and routine solutions to generate some different ideas and possibilities. • Examine words that show reasons and words that show conclusions. • Compare and contrast information and ideas in own and others' reasoning. • Consider how reasons and examples are used to support a point of view and illustrate meaning. • Consider ways to express and describe thinking activity, including the expression of feelings about learning, both to others and to self. 	<p>GESI: When teaching the characteristics of science, it is important to consider GESI values to ensure an inclusive and equitable learning environment for all students:</p> <ul style="list-style-type: none"> • Promote the idea that all genders and abilities have equal abilities and potential in scientific fields • Ensure representation by highlighting the contributions of scientists from different genders throughout history and in contemporary science. • Discuss how societal expectations and biases can influence perceptions of GESI roles in scientific fields and the importance of breaking free from these stereotypes. • Promote collaborative learning environments where students work together in diverse teams, respecting each other's contributions and learning from one another. • Encourage the value of diverse perspectives and experiences in scientific inquiry. <p>SEL: Learners having experienced a science pedagogy that ensures social and emotional learning skills (SELS) and working with each other will lead to:</p> <ul style="list-style-type: none"> • working to build learners' self-confidence.

¹ Gender Equality and Social Inclusion

² Socio-Emotional Learning

	<ul style="list-style-type: none"> • Explore some learning strategies, including planning, repetition, rewording, memorisation and use of mnemonics. • Investigate ways to problem-solve using experiential language. • Use and give examples of different kinds of questions. Generate ideas that are new and make choices after considering personal preferences. • Identify words that indicate components of a point of view. Use reasons and examples for different purposes. • Express and describe the thinking activity. Practice some learning strategies. Demonstrate and articulate some problem-solving approaches. <p>Digital Literacy: Learning from internet resources.</p> <p>Cultural identity: Explore instances of the application of characteristics of science that are similar to the national shared values – Respect, humility, loyalty, patriotism, etc.</p>	<ul style="list-style-type: none"> • regularly acknowledge students’ strengths • fostering an environment that supports relationship building among learners and between students and staff. • allowing learners to have a decision-making role related to classroom activities and rules. • help students accurately assess their own capabilities and qualities. <p>National Core Values: Tolerance, friendliness, open-mindedness, patience, hard work, humility</p>
<p>I.1.1.LO.2</p> <p>Explain the functions of solids in life.</p>	<p>Digital Literacy: Learners use the internet to research to identify different solids.</p> <p>Research skills: Learners use the research to identify different solids</p> <p>Communication and Collaboration: Working in mixed-sex groups to discuss solids.</p>	<p>GESI: Learners having experienced a science pedagogy that embeds or aligns gender equality and social inclusion and working in an inclusive way, cross-sharing knowledge and understanding among groups and individuals lead them to:</p> <ul style="list-style-type: none"> • gain respect for individuals' opinions • being sensitive to the inter-relatedness of the various spheres of life, groups, and individuals. • being aware of their own biases and stereotypes • embrace diversity and practice inclusion. <p>SEL: Learners having experienced a science teaching pedagogy that ensures social and emotional learning skills (SELS) and working with each other will lead to:</p> <ul style="list-style-type: none"> • Demonstrating respect for diversity among students

		<ul style="list-style-type: none">• Providing opportunities for learners to practise communication skills (e.g., verbalizing your message, listening to others).• Reflecting on positive and negative choices in relationships and the consequences of each choice. <p>National Values: Patience, tolerance, compassion, hard work, honesty, humility</p>
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Content Standards	Learning Indicators and Pedagogical Exemplars 21st- Century Skills and GESI	Assessment
I.1.1.CS.1	I.1.1.LI.1	I.1.1.AS.1
Demonstrate knowledge and understanding of the characteristics of science and show how they are applied in everyday life.	<p>Explain the characteristics of science in nature.</p> <p>Collaborative Learning:</p> <ol style="list-style-type: none"> Learners work in mixed-ability groups to discuss the various characteristics of science using videos/charts/pictures and examples from their communities and cultural backgrounds, supporting students to appreciate cultural diversity and the internet. Learners reflect and cross-share their views of different situations in life where the characteristic of science is evident. While cross-sharing, learners must demonstrate tolerance for divergent views. 	Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning
	I.1.1.LI.2	I.1.1.AS.2
	<p>Design projects using the characteristics of science</p> <p>Work individually and in mixed-ability groups to design various science characteristics-based projects using books, the internet and other sources and demonstrate how the characteristics of science are used in the design.</p>	Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning
	I.1.1.LI.3	I.1.1.AS.3
<p>Apply the characteristics of science where appropriate.</p> <p>Learners work in mixed-ability groups, supervised by the teacher to ensure all learners participate in exploring instances from their immediate environment and the internet (where possible) of the application of characteristics of science.</p>	Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning	

		Level 4 Extended critical thinking and reasoning
Teaching and Learning Resources	<ul style="list-style-type: none"> • Internet resources such as Massive Open Online Courses (MOOCs) • Projectors • Poster pictures showing scenarios in which the characteristics of science are displayed. (E.g. https://evolution.berkeley.edu/nature-of-science/characteristics-of-science/and https://www.sciencebuddies.org/science-fair-projects/project-ideas/list) 	

Content Standards	Learning Indicators and Pedagogical Exemplars with 21st-Century Skills and GESI	Assessment
I.1.1.CS.2	I.1.1.LI.1	I.1.1.AS.1
Know, understand, and identify the roles of solids in life.	<p>Classify different solids and their uses.</p> <p>Talk for Learning: Through a whole class session, guide learners to use charts of the periodic table to review the grouping of elements into metals, semi-metals and non-metals.</p> <p>Activity-based Learning:</p> <ul style="list-style-type: none"> • Using samples of metals, semi-metals and non-metallic materials, guide learners to identify and distinguish between their properties such as lustre, electrical and heat conductivity, density, malleability, ductility, tensile strength and sonority. • Guide learners to work in pairs to distinguish between: <ol style="list-style-type: none"> 1. metals and non-metals 2. semi-metals and non-metals 3. metals and semi-metals • Assist learners in undertaking a practical activity to demonstrate the corrosion of metals and explain how corrosion or rusting can be prevented. <p>Individualised Learning: Work individually to create mind-maps that show the relationship between the characteristic properties of metals, semi-metals and non-metals and their respective uses and applications in daily life.</p>	Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning
	<p>I.1.1.LI.2</p> <p>Apply the properties of solids to everyday use.</p> <p>Learners research how the properties of different solids relate to their uses in life. Provide opportunities for students to evaluate various real-world scenarios and make decisions based on the information at hand.</p>	I.1.1.AS.2 Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning

	I.I.I.LI.3		I.I.I.AS.3
	<p>Discuss the relationship between binary compounds, the composition of binary compounds and the names of compounds.</p> <p>Using Talk for Learning approaches:</p> <ul style="list-style-type: none"> • Guide learners to revise from the JHS curriculum B9.I.I.I.I about the nature of compounds. Provide opportunities for students to practise skills related to respecting others as they use the Talk for Learning approach. • With the aid of models, videos, charts, and the internet, learners discuss the relationship between binary compounds (such as CO₂, NO₂, etc.), their composition, and chemical equations. Provide opportunities for students to listen to their peers' opinions and express disagreements in constructive ways. 		<p>Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning</p>
Teaching and Learning Resources	<ul style="list-style-type: none"> • Internet resources such as Massive Open Online Courses (MOOCs) (https://www.youtube.com/watch?v=N4MdZxI fgbA; https://www.youtube.com/watch?v=ZcF8E8aAOGs; https://www.youtube.com/watch?v=vTq4sgGd2QU) • Projectors • Charts 	<ul style="list-style-type: none"> • Pictures of Binary compounds, • Equations and reaction equations • Books and Journals. 	<ul style="list-style-type: none"> • Videos on the relationship between binary compounds, chemical equations, and names of compounds • Models

Subject **GENERAL SCIENCE**
Strand **2. PROCESSES FOR LIVING**
Sub-Strand **1. ESSENTIALS FOR SURVIVAL**

Learning Outcomes	21st-Century Skills and Competencies	GESI, SEL and Shared National Values
1.2.1.LO.1		
<p>Appreciate the movement of substances in biotic and abiotic media.</p>	<p>Creativity and Innovation: Learners make presentations and model the process of osmosis.</p> <p>Communication and Collaboration: Putting learners in differentiated learning groups will facilitate communication and collaboration skills acquisition.</p> <p>Critical Thinking and Problem-Solving Skills: Learners make presentations and discuss applications of diffusion.</p> <p>Critical Thinking:</p> <ul style="list-style-type: none"> • Consider personal reactions to situations or problems and how these reactions may influence thinking. • Make simple modifications to known ideas and routine solutions to generate some different ideas and possibilities. • Examine words that show reasons and words that show conclusions. • Compare and contrast information and ideas in own and others' reasoning. 	<p>GESI: Learners having experienced a science pedagogy that embeds or aligns gender equality and social inclusion and working in an inclusive way, cross-sharing knowledge and understanding among groups and individuals lead them to:</p> <ul style="list-style-type: none"> • gain respect for individuals' opinions. • be sensitive to the inter-relatedness of the various spheres of life, groups, and individuals. • being aware of their own biases and stereotypes • embrace diversity and practice inclusion. <p>SEL: Learners having experienced a science teaching pedagogy that ensures social and emotional learning skills (SELS) and working with each other will lead to:</p>

	<ul style="list-style-type: none"> • Consider how reasons and examples are used to support a point of view and illustrate meaning. • Consider ways to express and describe thinking activity, including the expression of feelings about learning, both to others and to self. • Explore some learning strategies, including planning, repetition, rewording, memorisation and use of mnemonics. • Investigate ways to problem-solve using experiential language. • Use and give examples of different kinds of questions. Generate ideas that are new and make choices after considering personal preferences. • Identify words that indicate components of a point of view. Use reasons and examples for different purposes. • Express and describe the thinking activity. Practice some learning strategies. Demonstrate and articulate some problem-solving approaches. 	<ul style="list-style-type: none"> • Demonstrating respect for diversity among learners • Reflecting on positive and negative choices in relationships and the consequences of each choice. • Incorporating emotional and behavioural regulation techniques that include breathing exercises, muscle relaxation, journaling, mindfulness exercises, and the use of nonverbal means of expression such as music, art, dance, and yoga. <p>National Core Values: Tolerance, friendliness, open-mindedness, patience, hard work, humility</p>
1.2.1.LO.2		
<p>Illustrate the principles of reproduction.</p>	<p>Digital Literacy:</p> <ol style="list-style-type: none"> 1. Operating videos and the internet will enhance digital literacy skills. 2. Working with videos. <p>Communication and Collaboration: Learners discuss and describe the structure of the reproductive system.</p> <p>Critical Thinking:</p> <ol style="list-style-type: none"> 1. Dealing with misconceptions. 2. Consider personal reactions to situations or problems and how these reactions may influence thinking. 3. Make simple modifications to known ideas and routine solutions to generate some different ideas and possibilities. 	<p>GESI: Learners having experienced a science pedagogy that embeds or aligns gender equality and social inclusion and working in an inclusive way, cross-sharing knowledge and understanding among groups and individuals lead them to:</p> <ul style="list-style-type: none"> • gain respect for individuals' opinions. • being sensitive to the inter-relatedness of the various spheres of life, groups, and individuals. • being aware of their own biases and stereotypes • embrace diversity and practice inclusion.

	<ol style="list-style-type: none"> 4. Examine words that show reasons and words that show conclusions. 5. Compare and contrast information and ideas in own and others' reasoning 6. Consider how reasons and examples are used to support a point of view and illustrate meaning 7. Consider ways to express and describe thinking activity, including the expression of feelings about learning, both to others and to self. 8. Explore some learning strategies, including planning, repetition, rewording, memorisation, and use of mnemonics. 9. Investigate ways to problem-solve using experiential language. 10. Use and give examples of different kinds of questions. Generate ideas that are new and make choices after considering personal preferences. 11. Identify words that indicate components of a point of view. Use reasons and examples for different purposes. 12. Express and describe thinking activity. Practice some learning strategies. Demonstrate and articulate some problem-solving approaches. 	<p>SEL: Learners having experienced a science teaching pedagogy that ensures social and emotional learning skills (SELS) and working with each other will lead to:</p> <ul style="list-style-type: none"> • fostering an environment that supports relationship building among learners and between students and staff. • offering positive support when learners are having difficulties with self-regulation. • fostering learners' awareness of real-world problems and issues to apply what they are learning. • building learners' self-confidence. • offering positive support when learners are having difficulties with self-regulation. <p>National Core Values: Tolerance, friendliness, open-mindedness, patience, hard work, humility</p>
1.2.1.LO.3		
<p>Design Possible solutions to address sexually related societal problems.</p>	<p>Communication and Collaboration: Using Talk for Learning.</p> <p>Problem-solving skills: Calculate the menstrual cycle.</p> <p>Digital Literacy: Internet resources and making presentations using projectors/PowerPoints, etc.</p>	<p>GESI: Learners having experienced a science pedagogy that embeds or aligns gender equality and social inclusion and working in an inclusive way, cross-sharing knowledge and understanding among groups and individuals lead them to:</p> <ul style="list-style-type: none"> • gain respect for individuals' opinions.

	<p>Global citizenship: Examining adolescent reproductive health as a global issue.</p> <p>Communication and Collaboration Using Talk for Learning</p>	<ul style="list-style-type: none"> • being sensitive to the inter-relatedness of the various spheres of life, groups, and individuals. • being aware of their own biases and stereotypes. • embrace diversity and practice inclusion • Identify and examine traditional gender roles and stereotypes. <p>SEL: Learners having experienced a science teaching pedagogy that ensures social and emotional learning skills (SELS) and working with each other will lead to:</p> <ul style="list-style-type: none"> • fostering an environment that supports relationship building among learners and between learners and staff. • offering positive support when learners are having difficulties with self-regulation. • fostering learners’ awareness of real-life issues builds learners’ self-confidence. • offering positive support when learners are having difficulties with self-regulation <p>National Values Tolerance and respect for human dignity. Cleanliness, Friendliness, Respect, Empathy</p>
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Content Standards	Learning Indicators and Pedagogical Exemplars with 21st-Century Skills and GESI		Assessment
1.2.1.CS.1	1.2.1.LI.1		1.2.1.AS.1
Demonstrate understanding and appreciation and model the movement of substances in biotic and abiotic media.	<p>Explain the concept of diffusion and its application in life.</p> <ol style="list-style-type: none"> Using the guided learning approach, put learners in mixed-ability groups to design and model the osmosis process. <p>NOTE: Ensure that learners remain attentive throughout the learning period.</p> <ol style="list-style-type: none"> Learners in mixed-sex and mixed-ability groups present their work to the class. Learners make presentations in a mixed-ability group to explain osmosis. Encourage females to play key roles in the presentation if possible. Learners should discuss the application of osmosis in everyday life. 		<p>Level 1 Recall</p> <p>Level 2 Skills of conceptual understanding</p> <p>Level 3 Strategic reasoning</p> <p>Level 4 Extended critical thinking and reasoning</p>
	1.2.1.LI.2		1.2.1.AS.2
	<p>Design, model and explain the osmosis process and indicate its application to everyday life.</p> <ul style="list-style-type: none"> Group learners according to different abilities and mixed-sex where appropriate. Use think-pair-share to discuss diffusion and its application. Demonstrate the diffusion process by using perfume/Potassium Permanganate crystals/volatile substances like camphor. <p>NOTE: Check for learners who are allergic to strong scents. Ensure that there is no air blowing. Care must be taken when introducing potassium permanganate into water. Do not use 'spread perfume'.</p>		<p>Level 1 Recall</p> <p>Level 2 Skills of conceptual understanding</p> <p>Level 3 Strategic reasoning</p> <p>Level 4 Extended critical thinking and reasoning</p>
Teaching and Learning Resources	<ul style="list-style-type: none"> Cellophane or any suitable substance available. Yam tissue, potato tissue or any suitable substance available. Table salt/sugar. Water Bowl 		<ul style="list-style-type: none"> Colour (washing blue) Video Clips/2. Internet resources such as (https://www.youtube.com/watch?v=jhszFBtBPoI; https://www.youtube.com/watch?v=JnlkGtK0-Js) Liquid perfume in a container with a lid. Potassium Permanganate crystals, Camphor

Content Standards	Learning Indicators and Pedagogical Exemplars (with emphasis on 21st-Century Skills and Competencies and GESI)	Assessment
1.2.1.CS.2	1.2.1.LI.1	1.2.1.AS.1
<p>Demonstrate knowledge and understanding of the principles of reproduction and their application in addressing sexually related societal problems.</p>	<p>Explain reproduction in plants and humans.</p> <p>Activity-based Learning</p> <ul style="list-style-type: none"> • Embark on a nature walk around the school to observe different kinds of plants. • Task learners to identify the parts of the various plants observed that are used in reproduction. <p>Project-based Learning: Place learners into groups to prepare and give presentations on:</p> <ul style="list-style-type: none"> • Sexual reproduction in plants using resources such as flowers, fruits and seeds. • Asexual reproduction in plants using vegetative parts such as corm, rhizome, suckers, stem cuttings and bulbs. • Pollination and its role in sexual reproduction in plants. <p>Activity-Based Learning</p> <ul style="list-style-type: none"> • Using models, videos, pictures or charts of the female reproductive system, learners describe the structure and explain the function of the parts of the structure. • Allow learners to raise critical concerns for clarifications from experiences or misconceptions concerning the structure and function of the female reproductive system of mammals. • Be aware of stereotypes when using videos, pictures, models or charts. Learners describe the structure and explain the functions of the parts of the male reproductive system. 	<p>Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning</p>
	1.2.1.LI.2	1.2.1.AS.2

	<p>Explain the female menstrual cycle and show how that can be used to address reproduction-related issues.</p> <ul style="list-style-type: none"> Put learners into mixed-ability groups and guide them to calculate the menstrual cycle using pictures/charts/videos. Using Talk for Learning strategies and reflections from Internet resources/books, compare global best practices of menstrual hygiene. 	<p>Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning</p>
	1.2.1.LI.3	1.2.1.AS.3
	<p>Apply knowledge of reproduction-related issues (teenage pregnancy, STI, reproductive health) to address challenges of adolescent reproductive health.</p> <p>Learners work in mixed-ability groups and different ability groups using Talk for Learning approaches to examine and make presentations on adolescent reproductive health issues.</p> <p>NOTE:</p> <ul style="list-style-type: none"> <i>Ensure that each group addresses a particular issue.</i> <i>Encourage males to play leading roles in supporting female experiences and participate fully in the activities for menstrual hygiene day, 28th May, every year.</i> 	<p>Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning</p>
<p>Teaching and Learning Resources</p>	<ul style="list-style-type: none"> Videos Pictures Charts/pictures and models of the reproductive system of male and female humans. Videos of the reproductive system of mammals. Internet resources such as https://www.webmd.com/baby/healthtool-ovulation-calculator; 	<ul style="list-style-type: none"> Books Charts/videos/pictures of the menstrual cycle. Internet resources such as (https://www.webmd.com/baby/healthtool-ovulation-calculator; https://www.always.com/en-us/period-calculator) Flowers, fruits and seeds

	<p>https://www.unfpa.org/resources/adolescent-sexual-and-reproductive-health;</p> <p>https://www.youtube.com/watch?v=IBHRwkZPNac;</p> <ul style="list-style-type: none"> • Journals 	<ul style="list-style-type: none"> • Vegetative parts of plants such as corm, rhizome, suckers, stem cuttings and bulbs. <p>Videos showing propagation in plants, projectors and other ICT resources.</p>
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Subject **GENERAL SCIENCE**
Strand **3. VIGOUR BEHIND LIFE**
Sub-Strand **1. POWERING THE FUTURE WITH ENERGY FORMS.**

Learning Outcomes	21st-Century Skills and Competencies	GESI, SEL and Shared National Values
I.3.1.LO.1		
<p>Relate forms of energy to their sources and their generation.</p>	<p>Communication (Speaking and listening): Learners sharing ideas on the activities.</p> <p>Collaboration: Learners working together in groups to come out with various views.</p> <p>Digital Literacy: Simulations, videos and internet resources.</p> <p>Cultural Identity: examining and associating themselves with the materials from the school and home environment.</p> <p>Personal Development and leadership: Sharing reports on their projects based on usability.</p> <p>Communication and Collaboration: Communicate effectively verbally, non-verbally and through writing with peers in class.</p>	<p>GESI: Learners having experienced a science pedagogy that embeds or aligns gender equality and social inclusion and working in an inclusive way, cross-sharing knowledge and understanding among groups and individuals lead them to:</p> <ul style="list-style-type: none"> • gain respect for individuals' opinions • being sensitive to the inter-relatedness of the various spheres of life, groups, and individuals. • being aware of their own biases and stereotypes • embrace diversity and practice inclusion. <p>SEL: Learners having experienced a science teaching pedagogy that ensures social and emotional learning skills (SELS) and working with each other will lead to:</p> <ul style="list-style-type: none"> • giving an opportunity to explore how they learn from each other. • acknowledging one another's strengths. • working together and building self-confidence. • managing their emotional reactions, thoughts and behaviours. • coping with stressful experiences.

		<ul style="list-style-type: none">• setting goals and working towards achieving them.• learning to listen to their peers' opinions and express disagreement in constructive ways. <p>National Core Values: Tolerance, friendliness, open-mindedness, patience, hard work, humility, curiosity, awareness, courage, tolerance, patience, assertiveness, critical, observant, openness, Fairness,</p>
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Content Standards	Learning Indicators and Pedagogical Exemplars with 21st- Century Skills and GESI	Assessment
I.3.1.CS.1	I.3.1.LI.1	I.3.1.AS.1
Demonstrate understanding of forms of energy, sources, their generation and effects on the environment.	<p>Describe the generation of electricity from solar cells/panels.</p> <ul style="list-style-type: none"> • Use a Talk for Learning approach to engage learners to revise various forms of electricity generation from the JHS curriculum (B7.4.2.1.1) and do group presentations. • Guide learners to use diamond nine strategy³ to brainstorm on the meaning, advantages, and disadvantages of solar energy to life and the environment. • Learners use concept maps/videos/pictures/charts/diagrams, and internet resources to describe electricity generation from solar panels to create awareness of the relationship between solar energy and the environment. 	Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning
	<p>I.3.1.LI.2</p> <p>Design and build Solar panel using locally available materials.</p> <ol style="list-style-type: none"> 1. Learners watch videos/simulations or look at diagrams/drawings of how solar panels are made. 2. Provide guidelines for learners to collect different materials from their immediate environment (home and school) that can be used for building solar panels. 3. Using a Project-based approach, learners work in mixed-ability groups to design solar panels using the materials collected from the environment. 4. Provide opportunities for learners to reflect on their project through reporting, cross-sharing and think-pair-share on its usability and advantages. 	I.x.3.1.AS.2 Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning
Teaching and Learning Resources	<ul style="list-style-type: none"> • Prototypes of solar panels • Charts, pictures, and simulations of various forms of electricity generation. 	

³ [What is diamond ranking strategy? \(k12teacherstaffdevelopment.com\)](http://k12teacherstaffdevelopment.com)

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| | <ul style="list-style-type: none">• Internet resources such as (https://www.youtube.com/watch?v=9BgDt407uQc;
https://www.youtube.com/watch?v=lxoHqV2fMK4)• Different appropriate materials from the environment. |
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Subject **GENERAL SCIENCE**
Strand **3. VIGOUR BEHIND LIFE**
Sub-Strand **2. FORCES ACTING ON SUBSTANCES AND MECHANISMS**

Learning Outcomes	21st- Century Skills and Competencies	GESI, SEL and Shared National Values
<p>1.3.2.LO.1</p> <p>Apply various forms of forces according to their effects on motions.</p>	<p>Communication and Collaboration:</p> <ol style="list-style-type: none"> 1. Working in groups will encourage sharing of ideas among learners. 2. Learners' ability to explain their views to their peers and respect each other's views will be encouraged. <p>Critical thinking and problem-solving: Learners will:</p> <ol style="list-style-type: none"> 3. Think strategically about the concepts and how to solve life problems. 4. Explore the applications of the concepts of forces. 5. Consider personal reactions to situations or problems and how these reactions may influence thinking. 6. Make simple modifications to known ideas and routine solutions to generate some different ideas and possibilities. 7. Examine words that show reasons and words that show conclusions 8. Compare and contrast information and ideas in own and others' reasoning. 9. Consider how reasons and examples are used to support a point of view and illustrate meaning. 10. Consider ways to express and describe thinking activity, including the expression of feelings about learning, both to others and to self. 11. Explore some learning strategies, including planning, repetition, rewording, memorisation, and use of mnemonics. 	<p>GESI: Learners having experienced a science pedagogy that embeds or aligns gender equality and social inclusion and working in an inclusive way, cross-sharing knowledge and understanding among groups and individuals lead them to:</p> <ul style="list-style-type: none"> • gain respect for individuals of different beliefs, religions, and cultures • being sensitive to the inter-relatedness of the various spheres of life, groups, and individuals. • Being aware of their own biases and stereotypes • embrace diversity and practice inclusion • identify and examine traditional gender roles and stereotypes. <p>SEL: Learners having experienced a science teaching pedagogy that ensures social and emotional learning skills (SELS) and working with each other will lead to:</p> <ul style="list-style-type: none"> • giving an opportunity to explore how they learn from each other. • acknowledging one another's strengths.

	<p>12. Investigate ways to problem-solve using experiential language.</p> <ul style="list-style-type: none"> ○ Use and give examples of different kinds of questions. Generate ideas that are new and make choices after considering personal preferences. ○ Identify words that indicate components of a point of view. Use reasons and examples for different purposes. ○ Express and describe thinking activity. Practice some learning strategies. Demonstrate and articulate some problem-solving approaches. 	<ul style="list-style-type: none"> ● working together and building self-confidence. ● practice managing their emotional reactions, thoughts and behaviours. ● coping with stressful experiences. ● goals setting and work towards achieving them. ● listening to their peers' opinions and expressing disagreement in constructive ways. <p>National Core Values: Tolerance, friendliness, open-mindedness, patience, hard work, humility</p>
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Content Standards	Learning Indicators and Pedagogical Exemplars with 21st- Century Skills and GESI		Assessment
1.3.2.CS.I	1.3.2.LI.I		1.3.2.AS.I
Recognise the various forms of forces and their effects on motions.	Identify and explain concepts associated with forces. <ul style="list-style-type: none"> Using a Talk for Learning Approach, place learners in mixed-ability/mixed-sex groups to discuss the concepts of distance, displacement, speed, velocity and acceleration with contextual examples. Using the enquiry approach, guide learners to develop task sheets to explore real life applications of the concepts of speed, displacement, velocity, and acceleration while managing technical words and terminology. Using the 3E approach⁴, guide learners to engage, explore and explain concepts such as forces, momentum and pressure. Using differentiated learning and scaffolding, guide learners to explore the applications of the concepts of forces, Momentum and Pressure in real life. 		Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning
Teaching and Learning Resources	<ul style="list-style-type: none"> Stop clocks/watches. Charts, pictures and models. Bicycle wheels and pendulum bobs. PHET Simulations 	<ul style="list-style-type: none"> Pendulum bob Balls (Volley, foot, basket, etc.), Trolleys 	<ul style="list-style-type: none"> Pendulum bob, Balls (Volley, foot, basket, etc.), Siphoning materials (tube, container).

⁴ [3E Framework | 3E Education](#)

Subject **GENERAL SCIENCE**
Strand **3. VIGOUR BEHIND LIFE**
Sub-Strand **3. CONSUMER ELECTRONICS**

Learning Outcomes	21st- Century Skills and Competencies	SEL and Shared National Values
<p>I.3.3.LO.1</p> <p>Identify selected electronic components and their uses in household electronic gadgets and the use of amplifiers.</p>	<p>Critical Thinking and Problem Solving:</p> <ol style="list-style-type: none"> 1. Learner’s ability to think and solve problems by designing circuits and building amplifiers. 2. Consider personal reactions to situations or problems and how these reactions may influence thinking. 3. Make simple modifications to known ideas and routine solutions to generate some different ideas and possibilities. 4. Examine words that show reasons and words that show conclusions 5. Compare and contrast information and ideas in own and others' reasoning. 6. Consider how reasons and examples are used to support a point of view and illustrate meaning. 7. Consider ways to express and describe thinking activity, including the expression of feelings about learning, both to others and to self. 8. Explore some learning strategies, including planning, repetition, rewording, memorisation, and use of mnemonics. 9. Investigate ways to problem-solve using experiential language. 10. Use and give examples of different kinds of questions. Generate ideas that are new and make choices after considering personal preferences. 11. Identify words that indicate components of a point of view. Use reasons and examples for different purposes. 12. Express and describe the thinking activity. Practice some learning strategies. Demonstrate and articulate some problem-solving approaches. 	<p>GESI: Learners having experienced a science pedagogy that embeds or aligns gender equality and social inclusion and working in an inclusive way, cross-sharing knowledge and understanding among groups and individuals lead them to:</p> <ul style="list-style-type: none"> • gain respect for individuals' opinions • be sensitive to the inter-relatedness of the various spheres of life, groups, and individuals. • being of their own biases and stereotypes • embrace diversity and practice inclusion • identify and examine traditional gender roles and stereotypes. <p>SEL: Learners having experienced a science teaching pedagogy that ensures social and emotional learning skills (SELS) and working with each other will lead to:</p> <ol style="list-style-type: none"> 1. setting goals and working towards achieving them. 2. listening to their peers’ opinions and expressing disagreement in constructive ways. <ul style="list-style-type: none"> • completing their work with other peers in mixed-ability groups.

	<p>Collaboration and Communication: Learners report on their projects confidently and effectively to different participants in different contexts.</p> <p>Creativity and Innovation: Learners will be allowed to introduce their ideas in designing the documents, leading to innovation and creativity.</p>	<ul style="list-style-type: none"> ● acknowledging the importance of self and peer evaluation. ● adjusting to real-life scenarios and believing their thoughts and opinions are valued. <p>National Values: Curiosity, Awareness, Courage, Tolerance, Openness, Fairness.</p>
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Content Standards	Learning Indicators and Pedagogical Exemplars with 21st-Century Skills and GESI	Assessment
1.3.3.CS.1	1.3.3.LI.1	1.3.3.AS.1
Demonstrate knowledge and recognition of selected electronic components and their uses in Household Electronic devices.	<p>Explain the uses of electronic components in household electronic devices and amplifiers.</p> <ul style="list-style-type: none"> • Guide learners to revise the basic components of electronics from the JHS curriculum using Talk for Learning approaches and internet resources. • Demonstrate to learners how basic components of electronics are used in circuits and electronic devices using simulations, pictures, charts and realia. • In mixed-sex and differentiated groupings, learners design circuits involving transistors and switches and use them to build amplifiers. • Address stereotypes related to electronic components and household devices and encourage all learners to actively participate in learning activities. 	<p>Level 1 Recall</p> <p>Level 2 Skills of conceptual understanding</p> <p>Level 3 Strategic reasoning</p> <p>Level 4 Extended critical thinking and reasoning</p>
Teaching and Learning Resources	<ul style="list-style-type: none"> • Capacitor, LED, transistors, resistors, diodes, switches • Pictures/charts/videos of simple amplifiers. 	

Subject **GENERAL SCIENCE**
Strand **4. RELATIONSHIPS WITH THE ENVIRONMENT**
Sub-Strand **I. THE HUMAN BODY AND HEALTH**

Learning Outcomes	21st-Century Skills and Competencies	GESI, SEL and Shared National Values
<p>I.4.1.LO.1</p> <p>Discuss everyday hazards and how to manage them in the environment.</p>	<p>Communication and Collaboration using think-pair-share.</p> <p>Digital Literacy: the use of camera and voice recording device</p> <p>Problem-solving: Assess the possible risks and hazards associated with the industry.</p>	<p>GESI: Learners having experienced a science pedagogy that embeds or aligns gender equality and social inclusion and working in an inclusive way, cross-sharing knowledge and understanding among groups and individuals lead them to:</p> <ul style="list-style-type: none"> • gain respect for individuals' opinions • being sensitive to the inter-relatedness of the various spheres of life, groups, and individuals. • Being aware of their own biases and stereotypes • embrace diversity and practice inclusion • identify and examine traditional gender roles and stereotypes <p>SEL: Learners having experienced a science teaching pedagogy that ensures social and emotional learning skills (SELS) and working with each other will lead to:</p> <ul style="list-style-type: none"> • set goals and work towards achieving them. • learn to listen to their peers' opinions and express disagreement in constructive ways. • develop respectful relationships with one another, families and other people.

		<ul style="list-style-type: none"> • develop the skill of completing their work with other peers in mixed-ability groups. • acknowledge the importance of self and peer evaluation. • learn to adjust to real-life scenarios and believe their thoughts and opinions are valued. <p>National Core Values: Tolerance, friendliness, open-mindedness, patience, hard work, humility</p>
I.4.1.LO.2		
Distinguish various types of lifestyle diseases.	<p>Communication and Collaboration: Using Talk For Learning, think-pair-share</p> <p>Problem-solving: Allow learners to assess lifestyle diseases within their own environment.</p>	<p>GESI: Learners having experienced a science pedagogy that embeds or aligns gender equality and social inclusion and working in an inclusive way, cross-sharing knowledge and understanding among groups and individuals lead them to:</p> <ul style="list-style-type: none"> • gain respect for individuals' opinions • be sensitive to the inter-relatedness of the various spheres of life, groups, and individuals. • being aware of their own biases and stereotypes • embrace diversity and practice inclusion • identify and examine traditional gender roles and stereotypes, <p>SEL: Learners having experienced a science teaching pedagogy that ensures social and emotional learning skills (SELS) and working with each other will lead to:</p> <ul style="list-style-type: none"> • Foster an environment that supports relationship building among students and between students and staff.

		<ul style="list-style-type: none"> • Offer positive support when students are having difficulties with self-regulation. • Foster students' awareness of real-life issues • Build students' self-confidence. • Offer positive support when students are having difficulties with self-regulation. <p>National Core Values: Tolerance, friendliness, open-mindedness, patience, hard work, humility</p>
<p>1.4.1.LO.3 Clarify the concept of drugs and reflect on their effects on humans.</p>	<p>Communication and Collaboration: Learning in differentiated groups offers the opportunity for learners to interact and work together.</p> <p>Digital Literacy: use of the internet.</p>	<p>GESI: Learners having experienced a science pedagogy that embeds or aligns gender equality and social inclusion and working in an inclusive way, cross-sharing knowledge and understanding among groups and individuals lead them to:</p> <ul style="list-style-type: none"> • respect individuals' opinions. • be sensitive to the inter-relatedness of the various spheres of life, groups, and individuals. • be aware of personal biases and stereotypes • embrace diversity and practice inclusion. <p>SEL: Learners having experienced a science teaching pedagogy that ensures social and emotional learning skills (SELS) and working with each other will lead to:</p> <ul style="list-style-type: none"> • listening to their peers' opinions and expressing disagreement in constructive ways. • acknowledging the importance of self and peer evaluation.

		<ul style="list-style-type: none">• adjusting real-life scenarios and believing their thoughts and opinions are valued• helping students accurately assess their own capabilities and qualities.• becoming aware of their own emotions and internal states. <p>National Core Values: Tolerance, friendliness, open-mindedness, patience, hard work, humility</p>
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Content Standards	Learning Indicators and Pedagogical Exemplars with 21st- Century Skills and GESI	Assessment
1.4.1.CS.1	1.4.1.LI.1	1.4.1.AS.1
Demonstrate understanding of hazards in everyday life and how to manage them.	<p>Explore common risks and hazards in the environment and how to address them.</p> <ul style="list-style-type: none"> Enumerate possible hazards and risks in the home and workplace using think-pair-share. Visit a local industry that is accessible, such as sawmills, palm kernel oil production, gari processing, etc. and assess the possible risks and hazards associated with their activities. 	Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning
Teaching and Learning Resources	<ul style="list-style-type: none"> Pictures, charts, and videos on workplace and home hazards. Camera, voice recording device, writing materials. 	

Content Standards	Learning Indicators and Pedagogical Exemplars with 21st- Century Skills and GESI		Assessment
1.4.1.CS2	1.4.1.LI.1		1.4.1.AS.1
Show understanding of Lifestyle Diseases, their causes, symptoms and prevention.	<p>Describe lifestyle diseases, their causes, effects and prevention.</p> <ul style="list-style-type: none"> ▪ Invite a resource person (Healthcare giver/Medical practitioner/public health Nurse) to talk about lifestyle diseases. ▪ Allow learners to assess these lifestyle diseases within their own environment, noting diseases that easily leads to stigmatisation, using guided inquiry and cross-share with their peers in class. ▪ Using Talk for Learning approaches, let learners show the difference in the various lifestyle diseases according to their causes, effects, preventions and how to manage stigma on recovered patients. 		Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning
Teaching and Learning Resources	<ul style="list-style-type: none"> • Public Address system • Resource person • Pictures/videos of humans suffering from lifestyle diseases 	<ul style="list-style-type: none"> • Charts of diseases • Health Journals 	

Content Standards	Learning Indicators and Pedagogical Exemplars with 21st- Century Skills and GESI		Assessment
1.4.1.CS.3	1.4.1.LI.1		1.4.1.AS.1
Exhibit understanding of the concept of drugs and reflect on their effects on humans as well as their control.	<p>Analyse the attributes of drugs.</p> <ul style="list-style-type: none"> • Put learners in mixed-ability groups to brainstorm and come out with the attributes of drugs. • Invite a resource person to talk to learners about drugs, their attributes and harmful effects. • Learners use the internet, books, videos, and journals to search to consolidate what they have learnt on the effects of drugs on humans and how to control the use of drugs. 		Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning
Teaching and Learning Resources	<ul style="list-style-type: none"> • Computer with a modem, charts, videos, journals, and books showing people affected by drug abuse. • Resource person. 	<ul style="list-style-type: none"> • Active Internet services. • Computer and Mobile phones. 	

Subject **GENERAL SCIENCE**
Strand **4. RELATIONSHIPS WITH THE ENVIRONMENT**
Sub-Strand **2. TECHNOLOGY IN OUR LOCAL INDUSTRIES**

Learning Outcomes	21st-Century Skills and Competencies	GESI, SEL and Shared National Values
<p>1.4.2.LO.1</p> <p>Produce local soap in the community.</p>	<p>Communication: Writing a report about the field trip.</p> <p>Collaboration and Communication: working together in mixed-ability and mixed-sex groups.</p> <p>Critical Thinking:</p> <ol style="list-style-type: none"> 1. Designing an experiment to prepare a local soap. 2. Make simple modifications to known ideas and routine solutions to generate some different ideas and possibilities. 3. Compare and contrast information and ideas in own and others' reasoning 4. Consider how reasons and examples are used to support a point of view and illustrate meaning 5. Consider ways to express and describe thinking activity, including the expression of feelings about learning, both to others and to self 6. Explore some learning strategies, including planning, repetition, rewording, memorisation, and use of mnemonics 7. Investigate ways to problem-solve using experiential language <p>Digital Literacy:</p> <ul style="list-style-type: none"> • Technology devices • Operating digital cameras and voice recording devices. 	<p>GESI: Learners having experienced a science pedagogy that embeds or aligns gender equality and social inclusion and working in an inclusive way, cross-sharing knowledge and understanding among groups and individuals lead them to:</p> <ul style="list-style-type: none"> • gain respect for individuals' opinion • be sensitive to the inter-relatedness of the various spheres of life, groups, and individuals. • be aware of their own biases and stereotypes • embrace diversity and practise inclusion • identify and examine traditional gender roles and stereotypes. <p>SEL: Learners having experienced a science teaching pedagogy that ensures social and emotional learning skills (SELS) and working with each other will lead to:</p> <ul style="list-style-type: none"> • Completing their work with other peers in mixed-ability groups. • Acknowledging the importance of self and peer evaluation.

		<ul style="list-style-type: none"> Adjusting to real-life scenarios and believing their thoughts and opinions are valued <p>National Core Values: Tolerance, friendliness, open-mindedness, patience, hard work, humility</p>
I.4.2.LO.2		
Conduct a project on the production of an indigenous food and produce a report.	<p>Communication and Collaboration: Working in groups</p> <p>Critical Thinking: Designing the activity to prepare a local food</p> <p>Problem-solving: Designing the activity to prepare a local food</p>	<p>GESI: Learners having experienced a science pedagogy that embeds or aligns gender equality and social inclusion and working in an inclusive way, cross-sharing knowledge and understanding among groups and individuals lead them to:</p> <ul style="list-style-type: none"> Respect individuals of different beliefs, ideas and abilities Value and work in groups to enhance teamwork and friendliness to model an inclusive society. Embrace diversity and practice inclusion. Gain clarity on misconceptions/ myths about gender and disabilities as they relate to group dynamics in science. Interrogate their stereotypes and biases about gender roles in indigenous food production and leadership. <p>SEL: Learners having experienced a science pedagogy that ensures social and emotional learning skills (SELS) and working with each other will lead to:</p> <ul style="list-style-type: none"> Listening to their peers' opinions and expressing disagreement in constructive ways. Developing respectful relationships with one another and other people.

		<ul style="list-style-type: none"> • Developing the skill of completing their work with other peers in mixed-ability groups. • Acknowledging the importance of self and peer evaluation. • Learning to adjust to real-life scenarios and believe their thoughts and opinions are valued <p>National Values: Curiosity, vigilance, cooperation</p>
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Content Standards	Learning Indicators and Pedagogical Exemplars with 21st- Century Skills and GESI	Assessment
I.4.2.CS.1	I.4.2.LI.1	I.4.2.AS.1
Demonstrate understanding of the process of local soap making and design methods of producing soaps for different purposes for income generation.	<p>Experiment to produce different types of soap.</p> <ul style="list-style-type: none"> Organise a visit for learners to a place where local soap is produced and observe the processes of production. Write a report on the processes involved. Putting learners in mixed-ability groups, let them search the internet, brainstorm/think-pair-share on the science in the process (Saponification) of local soap making. 	<p>Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning.</p>
	<p>I.4.2.LI.2</p> <p>Explain the processes of producing different types of soap.</p> <ul style="list-style-type: none"> Put learners into mixed-ability groups to conduct experiments to prepare a local soap. They should vary the materials (reactants) to see the outcomes. Lead learners to visit a place in your community where local soap(s) is/are produced to observe and document the stages of production and the diversity in the soaps. Learners will then reflect and make presentations. Allow learners, working in convenient groups, to use the internet, books, and journals to brainstorm and write a report on the science processes (saponification, etc.) in the stages of production of the local soap. 	<p>I.4.2.AS.2</p> <p>Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning</p>
Teaching and Learning Resources	<ul style="list-style-type: none"> Writing materials Camera. Voice recording device Journal from a field trip Internet sources (https://www.youtube.com/watch?v=IMtzyxQiqKo, https://www.youtube.com/watch?v=Kc7duzDEa6Y) 	

Content Standards	Learning Indicators and Pedagogical Exemplars with 21st- Century Skills and GESI		Assessment
I.4.2.CS.2	I.4.2.LI.1		I.4.2.AS.1
<p>Explore the production of indigenous food (gari, akeyeke, yakeyake, kenkey [Ga or Fante], aboloo, tubaani, dawadawa, etc).</p>	<p>Investigate the production of an indigenous food to identify the science processes in the stages of production.</p> <ul style="list-style-type: none"> • Place learners into mixed-ability groups and let the learners design an activity to prepare a named local food. • Lead learners to visit a place in your community where local food is produced to observe and document the stages of production and the diversity in the foods. Learners will then reflect and make presentations. • Allow learners, working in convenient groups, to use the internet, books, and journals to brainstorm and write a report on the science processes (fermentation, sun drying, etc.) in the stages of production of the local food. 		<p>Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning</p>
<p>Teaching and Learning Resources</p>	<ul style="list-style-type: none"> • Voice recording device • Journal from a field trip • Internet sources (https://www.youtube.com/watch?v=IMtzyxQiqKo, https://www.youtube.com/watch?v=Kc7duzDEa6Y) • Potash (ash from burnt stalks, cocoa pods, plantain peels etc.), vegetable oil, fire source, saucepan, beaker, weighing scale, common salt, water, and filter paper. • Camera and voice recording device. • Journal from field trip. 	<ul style="list-style-type: none"> • Internet resources (http://pubs.sciepub.com/jfs/5/3/3/index.html, http://pubs.sciepub.com/jfs/5/3/3/index.html) • Local food materials/ingredients • Checklist of science processes involved in processing local food. • Writing materials • Camera 	

YEAR TWO

Subject **GENERAL SCIENCE**
Strand **I. EXPLORING MATERIALS**
Sub-Strand **I. SCIENCE AND MATERIALS IN NATURE**

Learning Outcomes	21st- Century Skills and Competencies	GESI ³ , SEL ⁴ and Shared National Values
2.1.1.LO.1		
<p>Describe the nature and uses of different liquids in the Lives of humans.</p>	<p>Communication and Collaboration</p> <ol style="list-style-type: none"> 1. Working together entails listening to each other and communicating in ways that are cordial. 2. Working together in small and mixed-ability groups. <p>Metacognition: Think through their own understanding of the materials they see every day in the environment.</p> <p>Personal Development: Working and collecting materials in the environment and in groups helps learners to deepen their knowledge of personal development.</p> <p>Critical Thinking: Designing and conducting experiments.</p>	<p>GESI: Learners having experienced a science pedagogy that embeds or aligns gender equality and social inclusion and working in an inclusive way, cross-sharing knowledge and understanding among groups and individuals lead them to:</p> <ul style="list-style-type: none"> • gain respect for individuals of different backgrounds • be sensitive to the inter-relatedness of the various spheres of life, groups, and individuals. • be aware of their own biases and stereotypes • embrace diversity and practise inclusion • identify and examine traditional gender roles and stereotypes. <p>SEL: Learners having experienced a science pedagogy that ensures social and emotional learning skills (SELS) and working with each other will lead to:</p> <p>Self-awareness: Explore how they learn Self-Management: Manage their observations and conclusions from the experiments and discussion Social Awareness: Listen to their peers' opinions and express disagreements or offer constructive suggestions.</p>

		<p>Relationship Skills: Offer opportunities to manage interpersonal conflicts in groups and during discussion of observations.</p> <p>National Core Values: Tolerance, friendliness, open-mindedness, patience, hard work, humility</p>
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Content Standards	Learning Indicators and Pedagogical Exemplars with 21st- Century Skills and GESI		Assessment
2.1.1.CS.1	2.1.1.LI.1		2.1.1.AS.1
Demonstrate understanding of liquids in the Lives of humans.	<p>Differentiate among acids, bases and water.</p> <p>Group/Collaborative Learning: Set up activities for different abilities and/or mix sex (where applicable) and supervise groups to perform experiments, observe and discuss the differences in acids, bases/alkalis, salts and water according to how they observe the activities individually and in groups.</p>		Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning
	2.1.1.LI.2		2.1.1.AS.2
	<p>Apply the knowledge of acids and bases in analysing the formation of salts and their uses.</p> <p>Collaborative Learning:</p> <ul style="list-style-type: none"> Provide worksheets as guidelines for groups of learners and supervise them to explore the mixing of acids and bases/alkalis to form salts. Let learners represent the combinations with equations and cross-share. Using think-pair-share, learners discuss the uses of salts. Pay attention to less assertive and other learners who need additional support. 		Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning
2.1.1.LI.3		2.1.1.AS.3	
<p>Describe how to measure the concentration of solutions and how to use the pH scale to identify the concentration of acids and bases/alkalis.</p> <p>Problem-Based Learning: In small mixed-ability groups, set up experiments for learners and supervise groups while providing support for learners who need extra support to prepare solutions of various concentrations and to identify acids, bases or alkalis using the pH scale.</p>		Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning	
Teaching and Learning Resources	<ul style="list-style-type: none"> Acid (HCl or any suitable one) 	<ul style="list-style-type: none"> measuring cylinders weighing scale 	<ul style="list-style-type: none"> mineral acids pH scale

	<ul style="list-style-type: none">• base/Alkali (CaO, $\text{Na}_2\text{O}/\text{Ca}(\text{OH})_2$, NaOH etc) reagents• conical flasks• white tiles• 250ml beakers	<ul style="list-style-type: none">• indicators• 1-litre volumetric flasks• alkali	<ul style="list-style-type: none">• stirrers• pipettes• distilled water
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Subject **GENERAL SCIENCE**
Strand **2. PROCESSES FOR LIVING**
Sub-Strand **1. ESSENTIALS FOR SURVIVAL**

Learning Outcomes	21st-Century Skills and Competencies	GESI, SEL and Shared National Values
2.2.1.LO.1		
Model and describe the structure and function of the human body parts that are responsible for the removal of waste.	<p>Collaboration and Communication: Learners work in mixed-sex groups to develop collaborative skills. Communication skills are developed when learners discuss in groups.</p> <p>Critical thinking and problem-solving: Give all learners equal opportunity to provide oral and/or written descriptions of the steps involved in the processes for the removal of waste from the human body system.</p>	<p>GESI: Learners having experienced a science pedagogy that embeds or aligns gender equality and social inclusion and working in an inclusive way, cross-sharing knowledge and understanding among groups and individuals lead them to:</p> <ul style="list-style-type: none"> • gain respect for individuals of different backgrounds • be sensitive to the inter-relatedness of the various spheres of life, groups, and individuals. • be aware of their own biases and stereotypes • embrace diversity and practice inclusion • identify and challenge traditional gender roles and stereotypes. <p>National Core Values: Tolerance, friendliness, open-mindedness, patience, hard work, humility</p>
2.2.1.LO.2		
Recognise and explain that the energy released during respiration is used to drive	<p>Digital Literacy:</p> <ul style="list-style-type: none"> • Working with videos and the internet will develop learners' digital literacy skills. • Using internet resources and videos 	<p>GESI: Learners having experienced a science pedagogy that embeds or aligns gender equality and social inclusion and working in an inclusive way, cross-sharing knowledge and understanding among groups and individuals lead them to:</p>

<p>processes in the human body.</p>	<p>Collaborative and Communication skills:</p> <ul style="list-style-type: none"> • Group work and discussions. • Using Talk For Learning in groups and whole class discussions. • Communication skills are developed as they share ideas in their various groups. <p>Self-confidence: Learners work in mixed-ability groups, share ideas and build their confidence level.</p>	<ul style="list-style-type: none"> • gain respect for individuals of different backgrounds. • being sensitive to the inter-relatedness of the various spheres of life, groups, and individuals. • be aware of their own biases and stereotypes • embrace diversity and practise inclusion • identify and challenge traditional gender roles and stereotypes. <p>SEL: Learners having experienced a science teaching pedagogy that ensures social and emotional learning skills (SELS) and working with each other will lead to:</p> <p><i>Responsible Decision Making:</i> Offer learners opportunities to make connections between classroom activities and their personal goals.</p> <p><i>Self-awareness:</i> Explore how they learn and build self confidence.</p> <p>National Core Values: Tolerance, friendliness, open-mindedness, patience, hard work, humility</p>
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Content Standards	Learning Indicators and Pedagogical Exemplars with 21st- Century Skills and GESI	Assessment
2.2.1.CS.1	2.2.1.LI.1	2.2.1.AS.1
Demonstrate an understanding of how waste substances are removed from the human body.	<p>Analyse the structure and function of the excretory organs in the human body.</p> <p>Group work/collaborative Learning: Using models or videos, put learners in mixed-ability groups and supervise groups to analyse the structure and function of excretory organs in the human body system.</p>	Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning
	2.2.1.LI.2	2.2.1.AS.2
	<p>Describe the processes for the removal of waste from the human body.</p> <p>Project-based Learning:</p> <ul style="list-style-type: none"> In mixed-ability groups, do a mini-investigation on the processes of removal of waste by the human excretory system using technological devices. In mixed-ability/ mixed-sex groups, perform an activity to demonstrate the process for the removal of waste from the human body system. 	Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning
2.2.1.LI.3	2.2.1.AS.3	
	<p>Evaluate disorders of the human excretory organ system.</p> <p>Project-based Learning:</p> <ol style="list-style-type: none"> In mixed-ability groups, do a mini-investigation on disorders of the human excretory system using internet resources and library sources that should be available to learners in advance. Learners do group critiquing of their investigations. 	Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning
Teaching and Learning Resources	<ul style="list-style-type: none"> Models or videos (see the link below) (https://www.kenhub.com/en/library/anatomy/human-body-systems) chart/picture, books Books 	<ul style="list-style-type: none"> Internet resources Journals Magazines

Content Standards	Learning Indicators and Pedagogical Exemplars with 21st- Century Skills and GESI		Assessment
2.2.1.CS.2	2.2.1.LI.1		2.2.1.AS.1
Demonstrate knowledge and ability to carry out research on how air moves in and out of humans.	<p>Explain, with diagrams, the concept of the movement of air in humans and its importance.</p> <p>Initiating Talk for Learning and Collaborative Learning:</p> <ul style="list-style-type: none"> With the aid of charts, models, pictures, etc., learners discuss and ascertain in groups of mixed-ability the movement of air in humans from the nostrils to the lungs. Learners brainstorm on the importance of the movement of air in humans from the nostrils to the lungs. 		Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning
	2.2.1.LI.2		2.2.1.AS.2
	<p>Describe the structure of the lungs and investigate the products of aerobic respiration.</p> <p>Group work/collaborative Learning:</p> <ul style="list-style-type: none"> With the aid of Models, videos, and charts, learners describe the structure of the human lungs in whole class discussion. In differentiated learning groups, use think-pair-share to investigate the products of aerobic respiration, supported by models, books, pictures, videos and internet sources. Learners reflect on the concepts of breathing and respiration and discuss the misconceptions between the two concepts. 		Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning
2.2.1.LI.3		2.2.1.AS.3	
<p>Discuss disorders associated with the respiratory system.</p> <p>Initiating Talk for Learning and Group work/collaborative Learning:</p> <ul style="list-style-type: none"> Put learners in differentiated learning groups to review the structure of the lungs after viewing videos/models or pictures of the human lungs with various disorders. Through think-pair-share, learners assess the effects of smoking on the structure of the lungs aided by pictures/videos and models. 		Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning	
Teaching and Learning Resources	<ul style="list-style-type: none"> Models or videos, pictures/charts/books and internet resources showing aerobic respiration. Models/pictures/charts or videos and internet resources 	<ul style="list-style-type: none"> Books Journals 	

Subject **GENERAL SCIENCE**
Strand **3. VIGOUR BEHIND LIFE**
Sub-Strand **1. POWERING THE FUTURE WITH ENERGY FORMS**

Learning Outcomes	21st- Century Skills and Competencies	GESI, SEL and Shared National Values
<p>2.3.1.LO.1</p> <p>Construct and analyse electric circuits in determining resistance, potential difference, and current and distinguish between step-up and step-down transformers.</p>	<p>Communication: Learners are given the opportunity to share their views through group work.</p> <p>Digital literacy skills will be enhanced as learners watch and operate videos and carry out simulations.</p> <p>Critical Thinking: Learners are encouraged to explore a variety of circuits and how they are used in homes and schools.</p> <p>Personal development and leadership as learners are given the opportunity to take up leadership roles in groups to explain their research findings. Learners use their roles assigned to them to express their views using their own language on the task.</p> <p>Critical thinking and problem-solving: Learners use the experiment to solve problems of electrocution among people when they touch electric appliances with wet hands.</p>	<p>GESI: Learners having experienced a science pedagogy that embeds or aligns gender equality and social inclusion and working in an inclusive way, cross-sharing knowledge and understanding among groups and individuals lead them to:</p> <ul style="list-style-type: none"> • gain respect for individuals of different backgrounds. • be sensitive to the inter-relatedness of the various spheres of life, groups, and individuals. • be aware of their own biases and stereotypes. • embrace diversity and practise inclusion. • identify and examine traditional gender roles and stereotypes. <p>SEL: Learners having experienced a science pedagogy that ensures social and emotional learning skills (SELS) and working with each other will lead to:</p> <p><i>Self-Awareness:</i> make learners feel successful and confident</p> <p><i>Social Awareness:</i> help learners to be aware of real-world problems and issues from the construction of cells from local materials.</p>

		<ul style="list-style-type: none">• <i>Self-Management</i>: help learners work together in groups and with partners. <p>National Core Values: Tolerance, friendliness, open-mindedness, patience, hard work, humility</p>
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Content Standards	Learning Indicators and Pedagogical Exemplars with 21st- Century Skills and GESI	Assessment
2.3.1.CS.1	2.3.1.LI.1	2.3.1.AS.1
Demonstrate understanding of electricity as a form of energy.	<p>Explain the concept of electrical energy and power.</p> <ul style="list-style-type: none"> • Review previous knowledge of sources of electrical energy through collaborative learning by using PHET simulations, pictures and videos. Ensure groups are manageable and supervised appropriately. • Put learners in mixed-ability groups to construct functional electric circuits and use them to calculate current, resistance and voltage while providing positive remarks to group work. • Demonstrate how meter reading is carried out and how to calculate energy consumed with meter reading and communicate their findings in groups. • Using inclusive and differentiated learning, the teacher demonstrates to learners how appliance troubleshooting at home or school is done and dispels misconceptions and stereotypes about males' and females' abilities in handling electricity. • Learners research on how to conduct energy audits, energy savings plans, and safety devices used in electrical circuits. • Through experiments, lead learners to demonstrate the electrical conductivity of different liquids (distilled water, drinking water, lemon juice, sugar solution, coconut oil, vinegar, and other appropriate liquids) • Use models, pictures and charts to help learners make their own cells through project-based teaching. • Assist learners to explain the heating effect of electric currents using Talk for Learning approaches. <p>NOTE: Learners should not taste the liquids during the activities.</p>	Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning
	2.3.1.LI.2	2.3.1.AS.2
	<p>Explain the principle of the transformer and its function.</p> <p>Demonstrate the build-up and usage of step-up and step-down transformers using practical activities.</p>	Level 1 Recall Level 2 Skills of conceptual understanding

		Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning on how the transformer works.
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Teaching and Learning Resources	<ul style="list-style-type: none">• PHET simulations, pictures, videos, charts and models showing sources of electrical energy.• LEDs, bulbs, dry cells, connecting wires and switches.• Meter, Videos, pictures and charts showing meter readings.	<ul style="list-style-type: none">• Testers, sockets.• Metal pins, rubber cap of injection bottle, connecting wires, distilled water, drinking water, vinegar, sugar solution and lemon juice.• Pictures and charts of step-up and step-down transformers.
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Subject **GENERAL SCIENCE**
Strand **3. VIGOUR BEHIND LIFE**
Sub-Strand **2. FORCES ACTING ON SUBSTANCES AND MECHANISMS**

Learning Outcomes	21st-Century Skills and Competencies	GESI, SEL and Shared National Values
<p>2.3.2.LO.1</p> <p>Explain and apply the concept of upthrust and the law of floatation in real life.</p>	<p>Communication and Collaboration:</p> <ul style="list-style-type: none"> • Learners do group presentations about their findings. • Personal development and leadership • Learners take leadership roles in reporting their findings. <p>Critical thinking and Problem-solving: Learners design and make prototype ships, canoes and other objects that use the law of floatation.</p> <p>Cultural identity: Learners use appropriate local materials to create their projects.</p>	<p>GESI: Learners having experienced a science pedagogy that embeds or aligns gender equality and social inclusion and working in an inclusive way, cross-sharing knowledge and understanding among groups and individuals lead them to:</p> <ul style="list-style-type: none"> • gain respect for individuals of different opinions. • be sensitive to the inter-relatedness of the various spheres of life, groups, and individuals. • be aware of their own biases and stereotypes • embrace diversity and practise inclusion • identify and examine traditional gender roles and stereotypes. <p>SEL: Learners having experienced a teaching method that ensures social and emotional learning skills (SELS) and working with each other will lead to:</p> <ul style="list-style-type: none"> • <i>Self-Awareness:</i> Help learners explore how they learn and assess their own capabilities and abilities as well as develop self confidence.

		<ul style="list-style-type: none">• <i>Self-Management</i>: Help learners set goals and achieve them in presentations and develop strategies to help manage their group work and presentations.• <i>Social Awareness and Relationship skills</i>: help learners to recognise and listen to their peers' ideas, disagree to agree on ideas and manage their personal conflicts peacefully. <p>National Core Values: Tolerance, friendliness, open-mindedness, patience, hard work, humility</p>
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Content Standards	Learning Indicators and Pedagogical Exemplars with 21st- Century Skills and GESI	Assessment
2.3.2.CS.1	2.3.2.LI.1	2.3.2.AS.1
Recognise the various types of motions, their applications and the forms of forces which act on the body.	<p>Discuss the relationship between upthrust and the law of floatation.</p> <ul style="list-style-type: none"> Using diamond nine, learners explain the concept of upthrust and the Law of Floatation. Using project-based approach, learners design and make prototype ships, canoes, and other objects which operate based on the Law of Floatation. 	<p>Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning that use the principle of floatation.</p>
Teaching and Learning Resources	<ol style="list-style-type: none"> 1. Beakers, water, simulations, videos. 2. Measuring cylinders, beakers, water and irregular objects. 	

Subject **GENERAL SCIENCE**
Strand **3. VIGOUR BEHIND LIFE**
Sub-Strand **3. Consumer Electronics**

Learning Outcomes	21st-Century Skills and Competencies	GESI, SEL and Shared National Values
<p>2.3.3.LO.1</p> <p>Apply the knowledge of doping to explain the formation and behaviour of a P- N junction diode.</p>	<p>Collaboration: Learners work in mixed-ability groups to share their ideas with peers.</p> <p>Communication: Learners are given equal opportunities to provide both oral and written steps for classifying semiconductors.</p> <p>Digital Literacy: Learners observe a video of doping and simulate doping.</p> <p>Critical thinking and problem-solving: Learners create and apply ideas about how to build phone chargers.</p>	<p>GESI: Learners having experienced a science pedagogy that embeds or aligns gender equality and social inclusion and working in an inclusive way, cross-sharing knowledge and understanding among groups and individuals lead them to:</p> <ul style="list-style-type: none"> • gain respect for individuals of different opinions. • be sensitive to the inter-relatedness of the various spheres of life, groups, and individuals. • be aware of their own biases and stereotypes • embrace diversity and practise inclusion • identify and challenge traditional gender roles and stereotypes <p>SEL: Learners having experienced a teaching method that ensures social and emotional learning skills (SELS) and working with each other will lead to:</p> <ul style="list-style-type: none"> • <i>Self-Awareness:</i> help learners to expand their vocabulary, manage their feelings and expressions and develop self confidence

		<p><i>Self-Management:</i> provide opportunities for learners to manage their work and set goals they can achieve.</p> <ul style="list-style-type: none"> • <i>Social Awareness and Relationship Skills:</i> Provide opportunities for learners to listen to their peers' opinions, express disagreement in constructive ways, demonstrate respect for each other, resolve interpersonal conflicts with each other and communicate positively in class. • <i>Responsible Decision-Making:</i> Provide opportunities for learners to make decisions in group work, work with their peers to solve problems and make connections between classroom activities and their personal goals. <p>National Core Values: Tolerance, friendliness, open-mindedness, patience, hard work, humility</p>
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Content Standards	Learning Indicators and Pedagogical Exemplars with 21st- Century Skills and GESI	Assessment	
2.3.3.CS.1	2.3.3.LI.1	2.3.3.AS.1	
Demonstrate knowledge and recognition of selected electronic components and their uses in household electronic devices.	<p>Explain the principle of 'doping' behaviour in relation to semiconductors.</p> <ul style="list-style-type: none"> Engage learners through Talk For Learning strategies to classify solid materials into conductors, insulators and semiconductors using simulations, charts and videos. While managing the words/terms that look technical or may be perceived as 'masculine'. Lead learners through demonstrations and group discussions using concept maps, practical activities and simulations to explain the concept of doping and its applications to the behaviour of P-N junction diode formation in consumer electronics. 	Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning	
	<p>2.3.3.LI.2</p> <p>Perform experiments using circuits containing LEDs and diodes to build phone chargers.</p> <p>Project-based Learning: Put learners in mixed-ability groups while paying close attention to learners who need extra support for differentiated learning. Guide learners to build phone chargers using appropriate electronic components.</p> <p>NOTE: In addition to phone chargers, any appropriate electronic device can be built</p>	2.3.3.AS.2 Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning	
Teaching and Learning Resources	<ul style="list-style-type: none"> Simulations Charts of solid materials videos P-N junction diodes. LEDs 	<ul style="list-style-type: none"> Diodes Resistors Capacitors Connecting wires Circuit board 	<ul style="list-style-type: none"> Breadboards Plastic materials Tester Metal leads.

Subject **GENERAL SCIENCE**
Strand **4. RELATIONSHIP WITH THE ENVIRONMENT**
Sub-Strand **1. THE HUMAN BODY AND HEALTH**

Learning Outcomes	21st-Century Skills and Competencies	GESI, SEL and Shared National Values
<p>2.4.1.LO.1</p> <p>Analyse pathogenic diseases, their symptoms, causes, effects and preventions.</p>	<p>Communication and Personal Development: Learners develop written and oral communication skills as they write and read reports.</p> <p>Critical Thinking and Problem-Solving: Through the application of knowledge in common diseases.</p>	<p>GESI: Learners having experienced a science pedagogy that embeds or aligns gender equality and social inclusion and working in an inclusive way, cross-sharing knowledge and understanding among groups and individuals lead them to:</p> <ul style="list-style-type: none"> • gain respect for individuals of different backgrounds • be sensitive to the inter-relatedness of the various spheres of life, groups, and individuals. • be aware of their own biases and stereotypes • embrace diversity and practise inclusion <p>SEL: Learners having experienced a teaching method that ensures social and emotional learning skills (SELS) and working with each other will lead to:</p> <ul style="list-style-type: none"> • <i>Self-Awareness:</i> Practice identifying and expressing their feelings about stereotypes in infections and pathogenic infections through group work, discussions and reflections. • <i>Self-Management/Social Awareness:</i> Help learners to set targets in a bid to identify pathogenic diseases in the communities and

		<p>describe them and explain the stereotypes for presentation in the classroom</p> <ul style="list-style-type: none">• <i>Relationship skills</i>: help learners work in groups and collaborate to analyse pathogenic infections. <p>National Core Values: Tolerance, friendliness, open-mindedness, patience, hard work, humility</p>
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Content Standards	Learning Indicators and Pedagogical Exemplars (with 21st-Century Skills and Competencies and GESI)	Assessment
2.4.1.CS.1	2.4.1.LI.1	2.4.1.AS.1
Demonstrate knowledge and understanding of pathogenic diseases of humans.	<p>Examine the characteristics, causes, symptoms and preventions of pathogenic diseases.</p> <p>Talk for Learning: Using mixed-ability groups while supervising groups to discuss symptoms and prevention of pathogenic diseases.</p>	Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning
	2.4.1.LI.2	2.4.1.AS.2
	<p>Examine specific pathogenic diseases within the community and describe their causes, symptoms and prevention.</p> <p>Problem-based Learning: Assign learners in groups or individually to identify a pathogenic disease in the community, describe it and explain how it can be prevented. Encourage learners to identify the myths and misconceptions surrounding these diseases while helping them to appreciate the stereotypes associated with these infections.</p>	Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning
Teaching and Learning Resources	<ul style="list-style-type: none"> • Charts of people showing symptoms of pathogenic diseases. • Wall charts showing causes, symptoms and prevention of pathogenic diseases. 	

Subject **GENERAL SCIENCE**
Strand **4. RELATIONSHIPS WITH THE ENVIRONMENT**
Sub-Strand **2. TECHNOLOGY IN LOCAL INDUSTRIES**

Learning Outcomes	21st-Century Skills and Competencies	GESI, SEL and Shared National Values
2.4.2.LO.1		
Describe the production process of indigenous beverages.	<p>Communication: Learners interact with resource persons and write a report. They also write down their observations.</p> <p>Digital Literacy:</p> <ol style="list-style-type: none"> 1. Using voice recording gadgets and a camera. 2. Taking photographs and recording the processes involved. <p>Critical Thinking through designing the flow charts.</p> <p>Personal development by doing individual design and experiment.</p> <p>Creativity and Innovation through designing the experiment</p>	<p>GESI: Learners having experienced a science pedagogy that embeds or aligns gender equality and social inclusion and working in an inclusive way, cross-sharing knowledge and understanding among groups and individuals lead them to:</p> <ul style="list-style-type: none"> • respect individuals of different beliefs, religions, and cultures • be sensitive to the inter-relatedness of the various spheres of life, groups, and individuals. • be aware of personal biases and stereotypes • embrace diversity and practise inclusion <p>SEL: Learners having experienced a teaching method that ensures social and emotional learning skills (SELS) and working with each other will lead to</p> <ul style="list-style-type: none"> • <i>Self-Awareness:</i> help learners acknowledge their strengths and develop self confidence in exploring indigenous production. • <i>Social Awareness:</i> helps learners to develop respect for others.

		National Core Values: Tolerance, friendliness, open-mindedness, patience, hard work, humility
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Content Standards	Learning Indicators and Pedagogical Exemplars with 21st- Century Skills and GESI		Assessment
2.4.2.CS.1	2.4.2.LI.1		2.4.2.AS.1
Explore the production of indigenous Beverages.	<p>Explain the science in the production of indigenous beverage.</p> <p>Project-based Learning:</p> <ul style="list-style-type: none"> Put learners in mixed-ability groups to visit a local industry where indigenous beverages are produced. Observe and document the processes involved in the production of indigenous beer/gin. In mixed groups, initiate a Talk For Learning approach to cross-share their presentations from the study trip to the local industry. 		Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning
	2.4.2.LI.2		2.4.2.AS.2
	<p>Design an experiment to produce a local beverage.</p> <p>Problem-based Learning: Guide learners to design a flow chart for the preparation of indigenous beverages and use it to prepare the beverages.</p>		Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning
Teaching and Learning Resources	<ul style="list-style-type: none"> Voice recording gadgets Camera Writing materials 	<ul style="list-style-type: none"> Raw materials for beverage production (sugarcane, maize, millet, etc.) Plastic Glass 	<ul style="list-style-type: none"> Earthenware energy source (Heat, electricity, solar)

YEAR THREE

Subject **GENERAL SCIENCE**
Strand **I. EXPLORING MATERIALS**
Sub-Strand **I. SCIENCE AND MATERIALS IN NATURE**

Learning Outcomes	21st-Century Skills and Competencies	GESI⁵, SEL⁶ and Shared National Values
3.1.1.LO.1		
<p>Explore the composition of air and the laboratory preparation and uses of oxygen and carbon dioxide.</p>	<p>Communication and Collaboration:</p> <ul style="list-style-type: none"> Learners working in groups will foster collaboration among themselves, and as they interact verbally, their communication skills will be enhanced. Learners develop collaboration and communication skills through classroom and laboratory interactions. <p>Digital Skills and Personal Development: Exploring the internet and working in the laboratory, the learners will enhance their research skills and digital skills.</p> <p>Critical Thinking: It will take critical thinkers to make deductions from the experiments learners perform. Research skills are acquired in the process of manipulating materials and reagents and making inferences. Research skills and critical thinking are acquired in the process of manipulating materials and reagents and making inferences.</p>	<p>GESI: Learners having experienced a science pedagogy that embeds or aligns gender equality and social inclusion and working in an inclusive way, cross-sharing knowledge and understanding among groups and individuals lead them to:</p> <ul style="list-style-type: none"> gain respect for individuals of different backgrounds be sensitive to the inter-relatedness of the various spheres of life, groups, and individuals. be aware of their own biases and stereotypes. embrace diversity and practice inclusion. <p>SEL: Learners having experienced a science pedagogy that ensures social and emotional learning skills (SELS) and working with each other will lead to:</p> <ul style="list-style-type: none"> Fostering learners' awareness of real-world problems and issues to apply what they are learning. Learners' choices about ways they can present their ideas.

		<ul style="list-style-type: none"> Learners acquire multiple options for communicating with the teacher and themselves. <p>National Core Values: Tolerance, friendliness, open-mindedness, patience, hard work, humility</p>
<p>3.1.1.LO.2</p> <p>Describe and analyse the origin and composition of natural gas.</p>	<ul style="list-style-type: none"> Communication and Collaboration: By working in groups, learners will interact and speak to each other to enhance collaboration and communication skills. Digital Literacy: By surfing the internet and watching videos for information, learners will sharpen their digital literacy skills. 	<p>GESI: Learners having experienced a science pedagogy that embeds or aligns gender equality and social inclusion and working in an inclusive way, cross-sharing knowledge and understanding among groups and individuals lead them to:</p> <ul style="list-style-type: none"> respect individuals of different opinions. be sensitive to the inter-relatedness of the various spheres of life, groups, and individuals.

		<ul style="list-style-type: none"> • be aware of personal biases and stereotypes. embrace diversity and practice inclusion. <p>SEL: Learners having experienced a science pedagogy that ensures social and emotional learning skills (SELS) and working with each other will lead to:</p> <ul style="list-style-type: none"> • Providing opportunities for learners to listen to their peers' opinions and express disagreements in constructive ways through social awareness. • Providing opportunities for learners to practise communication skills (e.g., verbalising your message, listening to others) • Encouraging learners to develop their own strategies on how to complete a task or learn a new concept to promote responsible decision-making • Offering learners with a range of strategies to help them manage their work (e.g., checklists, reminders, prompts) <p>National Core Values: Tolerance, friendliness, open-mindedness, patience, hard work, humility</p>
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Content Standards	Learning Indicators and Pedagogical Exemplars with 21st- Century Skills and GESI	Assessment
3.1.1.CS.1	3.1.1.LI.1	3.1.1.AS.1
Explore the concept of 'Air' as a mixture of useful gases in nature and understand the preparation of oxygen and carbon dioxide and their uses in human life.	<p>Identify air as a mixture and explain the uses of the components of air.</p> <p>Experiential Learning:</p> <ul style="list-style-type: none"> • Put learners in differentiated groups to explore, through laboratory activities, pictures, charts and videos from internet sources, air as a mixture, noting the various compositions of the gases, their relative abundance and their uses in nature. • Engage learners to perform simple experiments to test for the various components of air. • Provide an enabling environment for all learners to take part in all the activities to ensure the success of the lesson. 	Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning
	3.1.1.LI.2	3.1.1.AS.2
	<p>Prepare carbon dioxide and discuss its uses.</p> <p>Inclusive and Differentiated Learning: Put learners in different ability groups, guide them through demonstration in a laboratory or classroom on how to prepare carbon dioxide gas, and discuss its characteristics and uses and support learners who may react to the environment or materials (allergies).</p>	Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning
	3.1.1.LI.3	3.1.1.AS.3
<p>Prepare oxygen and discuss its uses.</p> <p>Experiential Learning: Put learners in different ability groups, guide them through demonstrations in a laboratory or classroom on how to prepare oxygen gas and discuss its characteristics and uses and also support learners who may react to the environment or materials (allergies).</p>	Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning	

Teaching and Learning Resources	<ul style="list-style-type: none"> • Internet sources such as MOOCs (E.g. https://www.youtube.com/watch?v=4p_aoxLlzs0; https://www.youtube.com/watch?v=eLIRijPpkIM) • A trough or a big bowl • Candle • Matches • measuring cylinder • Plastic bowl/trough • delivery tubes 	<ul style="list-style-type: none"> • Dilute hydrochloric acid (HCl) • Calcium Carbonate (CaCO₃)/eggshell • Beakers • conical flasks • collecting jars • charts • pictures illustrating that air is a mixture. 	<ul style="list-style-type: none"> • gas jar • thistle funnels or improvised forms of these materials • Hydrogen peroxide • Potassium Chlorate • delivery tube • water trough, etc. • Requisite glassware and reagents or improvised materials such as jugs,
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Content Standards	Learning Indicators and Pedagogical Exemplars with 21st-Century Skills and GESI	Assessment
3.1.1.CS2	3.1.1.LI.1	3.1.1.AS.1
Know, understand and identify the origin and composition of natural gas.	<p>Discuss the composition and uses of oil and natural gas.</p> <p>Collaborative and inquiry-based teaching approach:</p> <ul style="list-style-type: none"> • Use think-pair-share to initiate a discussion on the composition, usefulness and need for oil and gas discoveries in Ghana's economy. Give learners a take-home assignment to collate the benefits and dangers associated with oil and gas exploration in Ghana for discussion in the next lesson. • Put learners in mixed-ability/differentiated learning groups and provide them with books, pictures, charts, internet sources, and videos on the process of oil and gas extraction for learners to critically explore and discuss in their groups. Guide learners to use the language of the content and respect all ideas. • Provide the groups with a checklist to guide them to focus on fracturing or fracking of fluids in their discussion to build learners' self-confidence. 	<p>Level 1 Recall</p> <p>Level 2 Skills of conceptual understanding</p> <p>Level 3 Strategic reasoning</p> <p>Level 4 Extended critical thinking and reasoning</p>
Teaching and Learning Resources	<ul style="list-style-type: none"> • Books, videos, charts and pictures of oil and gas exploration. 	

Subject **GENERAL SCIENCE**
Strand **2. PROCESSES FOR LIVING**
Sub-Strand **1. ESSENTIALS FOR SURVIVAL**

Learning Outcomes	21st- Century Skills and Competencies	GESI, SEL and Shared National Values
<p>3.2.1.LO.1</p> <p>Model the structure of the nervous system and describe the functions of the parts of the nervous system.</p>	<p>Creativity and innovation: Using their imagination in role-playing the parts and functions of the central nervous system.</p> <p>Digital Literacy:</p> <ul style="list-style-type: none"> • Learning with videos and internet resources supports the acquisition of digital literacy skills. • Surfing the internet for videos. <p>Collaboration and Communication: Learners acquire collaborative and communication skills during interaction and discussion.</p>	<p>GESI: Learners having experienced a science pedagogy that embeds or aligns gender equality and social inclusion and working in an inclusive way, cross-sharing knowledge and understanding among groups and individuals lead them to:</p> <ul style="list-style-type: none"> • gain respect for individuals of different backgrounds. • be sensitive to the inter-relatedness of the various spheres of life, groups, and individuals. • be aware of their own biases and stereotypes • embrace diversity and practise inclusion. • identify and examine traditional gender roles and stereotypes. <p>SEL: Learners having experienced a science pedagogy that ensures social and emotional learning skills (SELS) and working with each other will:</p> <ul style="list-style-type: none"> • Provide opportunities for students to work together in groups or with partners. • Provide opportunities for students to evaluate their own work. • Work to build learners’ self-confidence.

		<p>National Core Values: Tolerance, friendliness, open-mindedness, patience, hard work, humility</p>
3.2.1.LO.2		
<p>Demonstrate how movement occurs in parts of the human body.</p>	<p>Collaboration and Communication: Learners interact in groups to develop collaboration and communication skills.</p> <p>Digital Literacy: Digital literacy is acquired when learners surf the internet in search of information.</p> <p>Global and Local Citizenship: Surfing the internet to gather information helps learners broaden their sphere of knowledge about the subject matter and understanding of their place in the world.</p> <p>Collaboration and Communication: Interactions in class will enable learners to acquire collaboration and communication skills</p>	<p>GESI: Learners having experienced a science pedagogy that embeds or aligns gender equality and social inclusion and working in an inclusive way, cross-sharing knowledge and understanding among groups and individuals lead them to:</p> <ul style="list-style-type: none"> • respect individuals of different opinions. • be sensitive to the inter-relatedness of the various spheres of life, groups, and individuals. • be aware of personal biases and stereotypes • embracing diversity and practising inclusion <p>SEL: Learners having experienced a science pedagogy that ensures social and emotional learning skills (SELS) and working with each other will lead to:</p> <ul style="list-style-type: none"> • Providing opportunities for learners to listen to their peers’ opinions and express disagreements in constructive ways through social awareness. • Providing opportunities for learners to practise communication skills (e.g., verbalizing your message, listening to others).

		<ul style="list-style-type: none">• Encouraging learners to develop their own strategies for how to complete a task or learn a new concept to promote responsible decision-making.• Offering learners with a range of strategies to help them manage their work (e.g., checklists, reminders, prompts). <p>National Core Values: Tolerance, humility, hard work, respect, friendliness</p>
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Content Standards	Learning Indicators and Pedagogical Exemplars with 21st- Century Skills and GESI	Assessment
3.2.1.CS.1	3.2.1.LI.1	3.2.1.AS.1
Model and demonstrate understanding of the nervous system, its parts and uses.	<p>Analyse the central nervous system.</p> <p>Experiential Learning: Put learners in mixed groups to role-play the parts and functions of the central nervous system using models, videos and pictures.</p>	Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning
	3.2.1.LI.2	3.2.1.AS.2
	<p>Explain the peripheral nervous system.</p> <p>Project-based Learning: Create different task groups and provide for groups the guidelines to work on the peripheral nervous system, such as examining the structure in relation to the functions using various models, pictures, videos, etc. and write reports. In the task groups, provide support to learners to reflect and present their reports.</p>	Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning
	3.2.1.LI.3	3.x.2.1.AS.3
	<p>Describe autonomic nervous system.</p> <p>Group work/collaborative Learning: In their differentiated learning groups, learners match the structure of neurons to their functions. Support groups to exchange and discuss their matchings and describe the structure and functions of the neuron.</p>	Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic Reasoning Level 4 Extended critical thinking and reasoning.
3.2.1.LI.4	3.2.1.AS.4	
<p>Discuss the generation and transmission of nerve impulses.</p> <p>Problem-Based Learning and Initiating Talk for Learning:</p>	Level 1 Recall Level 2 Skills of conceptual understanding	

	<ul style="list-style-type: none"> • Learners Think-pair and share in same-ability groups the pathways of communication within and between neurons using diagrams/video/pictures/simulation. • In a whole class discussion led by the teacher, guide learners to brainstorm on three of the major neurotransmitters and describe their functions. 	Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning
Teaching and Learning Resources	<ul style="list-style-type: none"> • Models, Videos, books and Pictures of the central nervous system. • Models, pictures, books, videos and the internet show the peripheral nervous system. • Computer/internet, diagrams/video/pictures and drawing paper 	

Content Standards	Learning Indicators and Pedagogical Exemplars with 21st- Century Skills and GESI	Assessment
3.2.1.CS.2	3.2.1.LI.1	3.2.1.AS.1
Develop an understanding of the relationships between bones, skeleton and muscles and the principles underlying the movement of various parts of the human body.	<p>Model and discuss the structure of the skeleton and muscles</p> <p>Collaborative Learning:</p> <ul style="list-style-type: none"> Learners use think-pair-share in mixed-ability groups to model and describe the structure and functions of the parts of the skeleton. Learners work in mixed-ability groups to describe the general structure and functions of human muscles and their attachment to skeletons human muscles' general structure and functions and share their ideas with peers using a model, picture or diagram. Learners use think-pair-share in mixed-ability groups to model and describe the nature of the movement of muscles. Summarise the movement of muscles into categories. 	Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning
	3.2.1.LI.2	3.x.2.1.AS.2
	<p>Demonstrate and explain the structure and function of the movement of muscle tissues.</p> <p>Initiating Talk for Learning: Let learners think-pair-share using video, pictures, and personal experience to describe how muscles bring about movement in humans. Discuss how challenges arise for human movement and encourage learners to appreciate the diversity in limb.</p> <p>NB: Explain the sliding filament model of muscle.</p>	Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning
Teaching and Learning Resources	<ul style="list-style-type: none"> Chart/picture/model of the general structure of the human skeleton Picture videos 	

Subject **GENERAL SCIENCE**
Strand **3. VIGOUR BEHIND LIFE**
Sub-Strand **1. POWERING THE FUTURE WITH ENERGY FORMS.**

Learning Outcomes	21st-Century Skills and Competencies	GESI, SEL and Shared National Values
<p>3.3.1.LO.1</p> <p>Analyse light energy and its uses in nature.</p>	<p>Communication and Collaboration: Learners work in groups to share ideas among themselves.</p> <p>Critical thinking and problem solving: Relating concepts of lenses and mirrors to life. e.g., vision, navigating in water bodies, etc.</p>	<p>GESI: Learners having experienced a science pedagogy that embeds or aligns gender equality and social inclusion and working in an inclusive way, cross-sharing knowledge and understanding among groups and individuals lead them to:</p> <ul style="list-style-type: none"> • gain respect for individuals of different backgrounds. • be sensitive to the inter-relatedness of the various spheres of life, groups, and individuals. • be aware of their own biases and stereotypes • embrace diversity and practise inclusion. • identify and challenge traditional gender roles and stereotypes. <p>SEL: Learners having experienced a science pedagogy that ensures social and emotional learning skills (SELS) and working with each other will:</p> <ul style="list-style-type: none"> • Give learners opportunities to explore how they learn through self-awareness. • Provide opportunities for learners to listen to their peers’ opinions and express disagreements in constructive ways through social awareness. • Encourage learners to develop their own strategies for how to complete a task or learn a

		<p>new concept to promote responsible decision-making.</p> <ul style="list-style-type: none">• Provide opportunities for learners to practise communication skills (e.g., verbalising your message, listening to others).• Offer learners a range of strategies to help them manage their work (e.g., checklists, reminders, prompts). <p>National Core Values: Tolerance, friendliness, open-mindedness, patience, hard work, humility</p>
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Content Standards	Learning Indicators and Pedagogical Exemplars with 21st- Century Skills and GESI	Assessment
3.3.1.CS.1	3.3.1.LI.1	3.3.1.AS.1
Demonstrate understanding of light energy, its sources and generation.	<p>Explain the concept of light energy and its uses.</p> <p>Group work: Guide learners to revise through brainstorming (review from B7.4.1.3 in JHS curriculum) in differentiated learning groups, the concept of light energy and discuss the domestic and industrial uses of light.</p>	<p>Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning.</p>
	3.3.1.LI.2	3.3.1.AS.2
	<p>Explore lenses and mirrors in relation to light energy in life.</p> <p>Project-based Learning: Let learners work in mixed-ability groups to discuss the types of mirrors and lenses using projects developed from mirrors and lenses.</p> <p>Diamond Nine: Let learners work according to different ability groups or pairs to discuss:</p> <ol style="list-style-type: none"> 1. Snell's law 2. Total internal reflection 3. Refractive index 4. Differences between lasers and fibre optics 5. How fibre optics work 6. Real and apparent depth. <p>Collaborative Learning:</p> <ol style="list-style-type: none"> 1. Put learners in smaller convenient groups to observe samples of projectors, simple microscopes, and periscopes and discuss their functions in industry and everyday life. 2. Guide learners to build prototypes of periscopes and demonstrate their usage in life. 3. Assist learners to brainstorm on professions that use knowledge of periscopes in their operations. <p>Talk for Learning: In mixed-ability groups, let learners demonstrate how lenses are used to correct eye defects. Using charts and models, let learners explain the causes of eye defects.</p>	<p>Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning</p>
Teaching and Learning Resources	<ul style="list-style-type: none"> • Pictures, videos and charts showing the concept of light, PHET simulations • Simulations, • Realia of lenses and mirrors, • Videos, charts and models. 	

Subject **GENERAL SCIENCE**
Strand **3. VIGOUR BEHIND LIFE**
Sub-Strand **2. FORCES ACTING ON SUBSTANCES AND MECHANISMS**

Learning Outcomes	21st-Century Skills and Competencies	GESI, SEL and Shared National Values
3.3.2.LO.1		
<p>Explain the concept of momentum and its application.</p>	<p>Communication and Collaboration: Learners develop listening and communication skills as they present their findings for discussion and accept different opinions from their peers.</p> <p>Digital Literacy: Through the use of videos and simulations, learners improve their digital literacy skills.</p> <p>Critical Thinking: by analysing the effects of forces on simple machines.</p> <p>Problem-solving: Learners will apply the knowledge of reducing the effects of friction in simple machines to everyday life.</p>	<p>GESI: Learners having experienced a science pedagogy that embeds or aligns gender equality and social inclusion and working in an inclusive way, cross-sharing knowledge and understanding among groups and individuals lead them to:</p> <ul style="list-style-type: none"> • gain respect for individuals of different backgrounds • be sensitive to the inter-relatedness of the various spheres of life, groups, and individuals. • be aware of their own biases and stereotypes • embrace diversity and practise inclusion • identify and challenge traditional gender roles and stereotypes. <p>SEL: Learners having experienced a science pedagogy that ensures social and emotional learning skills (SELS) and working with each other will lead to:</p> <ul style="list-style-type: none"> • Building learners' self-confidence to create self-awareness. • Providing opportunities for learners to practise skills related to respecting others.

		<ul style="list-style-type: none">• Learners acquire multiple options for communicating with the facilitator.• Working with learners to solve problems <p>National Core Values: Tolerance, friendliness, open-mindedness, patience, hard work, humility</p>
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Content Standards	Learning Indicators and Pedagogical Exemplars with 21st-Century Skills and GESI	Assessment
3.3.2.CS.1	3.3.2.LI.1	3.3.2.AS.1
Recognise the various forms of forces and their effects on motion.	<p>Identify different types of forces and their daily applications.</p> <p>Collaborative Learning:</p> <ul style="list-style-type: none"> • Use concept maps to explain different types of forces. • Using 3E learning model, let learners engage, explore and explain the applications of forces. NB: Emphasise frictional forces, factors influencing fluid friction and increase or decrease of friction. • Engage learners to discuss frictional force its effects and how to reduce it. 	Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning
	<p>3.3.2.LI.2</p> <p>Examine the differences between elastic and inelastic collisions of moving objects.</p> <p>Inquiry-based Teaching:</p> <ul style="list-style-type: none"> • Let learners explore the differences between elastic and inelastic collisions and collision of moving objects. • Learners discuss measures of avoiding collision with moving objects in their mixed-ability groups. 	Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning
Teaching and Learning Resources	<ul style="list-style-type: none"> • Charts, pictures, videos, simulations and realia of simple machines. • Simulations/videos, and pictures. 	

Subject **GENERAL SCIENCE**
Strand **3. VIGOUR BEHIND LIFE**
Sub-Strand **3. CONSUMER ELECTRONICS**

Learning Outcomes	21st-Century Skills and Competencies	GESI, SEL and Shared National Values
<p>3.3.3.LO.1</p> <p>Apply knowledge of electronic circuits to identify careers in electronics.</p>	<p>Communication and Collaboration:</p> <ul style="list-style-type: none"> • Learners share ideas among their peers. • Learners develop writing and listening skills from classroom interactions. <p>Digital Literacy: The use of digital devices to give information.</p> <p>Personal development: Learners explain their individual views about their work.</p> <p>Leadership as learners take up the responsibility of sharing their thoughts with their peers.</p>	<p>GESI: Learners having experienced a science pedagogy that embeds or aligns gender equality and social inclusion and working in an inclusive way, cross-sharing knowledge and understanding among groups and individuals lead them to:</p> <ul style="list-style-type: none"> • gain respect for individuals of different backgrounds. • be sensitive to the inter-relatedness of the various spheres of life, groups, and individuals. • be aware of their own biases and stereotypes. • embrace diversity and practise inclusion. • identify and challenge traditional gender roles and stereotypes. <p>SEL: Learners having experienced a science pedagogy that ensures social and emotional learning skills (SELS) and working with each other will lead to:</p> <ul style="list-style-type: none"> • Working with learners to solve problems to develop responsible decision-making

		<ul style="list-style-type: none">• Creating an environment in which learners believe that their thoughts and opinions are valued.• Providing opportunities for learners to work together in groups or with partners to promote relationship skills. <p>National Core Values: Tolerance, friendliness, open-mindedness, patience, hard work, humility</p>
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Content Standards	Learning Indicators and Pedagogical Exemplars with 21st-Century Skills and GESI		Assessment
3.3.3.CS.1	3.3.3.LI.1		3.3.3.AS.1
Demonstrate knowledge and recognition of selected electronic components and their uses in household electronic devices.	<p>Discuss consumer electronic devices and their components.</p> <p>Experiential Learning: Using inclusive and differentiated learning, engage learners to observe pictures, videos and drawings of consumer electronics devices and discuss their components.</p>		Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning
	3.3.3.LI.2	<p>Explore Consumer Electronic careers.</p> <p>Inquiry-based Teaching:</p> <ul style="list-style-type: none"> Let learners explore and explain career opportunities available in the field of consumer electronics. Assist learners to work in mixed-ability groups to use concept maps to illustrate the importance of consumer electronics and present their findings in class. Address common misconceptions about electronic components and household appliances. 	Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning
Teaching and Learning Resources	<ul style="list-style-type: none"> Mobile phones, Laptops Television Simulations 	<ul style="list-style-type: none"> videos and charts of consumer electronics devices and how they work in relation to electronic circuits. Resource person videos and pictures of professions associated with consumer electronics. 	

Subject
Strand
Sub-Strand

GENERAL SCIENCE
4. RELATIONSHIPS WITH THE ENVIRONMENT
1. THE HUMAN BODY AND HEALTH

Learning Outcomes	21st-Century Skills and Competencies	GESI, SEL and Shared National Values
<p>3.4.1.LO.1</p> <p>Describe the various features of heredity.</p>	<p>Collaboration and Communication: skills, accepting constructive feedback, and sharing through group work and accepting constructive feedback as well as sharing of ideas among learners.</p> <p>Digital Literacy skills using the internet to explore information.</p>	<p>GESI: Learners having experienced a science pedagogy that embeds or aligns gender equality and social inclusion and working in an inclusive way, cross-sharing knowledge and understanding among groups and individuals lead them to:</p> <ul style="list-style-type: none"> • gain respect for individuals of different backgrounds. • be sensitive to the inter-relatedness of the various spheres of life, groups, and individuals. • be aware of their own biases and stereotypes. • embrace diversity and practise inclusion. • identify and challenge traditional gender roles and stereotypes. <p>SEL: Learners having experienced a teaching method that ensures social and emotional learning skills (SELS) and working with each other will lead to:</p> <p><i>Self-awareness:</i> Learners accurately assess their own capabilities and qualities.</p>

		<p><i>Self-Management:</i> Learners manage their observations and conclusions from the experiments and discussion.</p> <p><i>Social Awareness:</i> Learners listen to their peers' opinions and express disagreements or offer constructive suggestions.</p> <p><i>Relationship Skills:</i> Learners offer learners multiple options for communicating with peers and teachers.</p> <p>National Core Values: Tolerance, friendliness, open-mindedness, patience, hard work, humility</p>
3.4.1.LO.2		
Design mind maps and concept maps of some Mendelian crossing to sex determination in humans.	<p>Personal development: Through individual work based on their interest and abilities, learners enhance their personal development</p> <p>Critical thinking and problem solving: Applying the concept of Mendelian crossing to sex determination will enhance their critical thinking and solve problems skills.</p> <p>Collaboration and Communication: Through group discussion, learners will interact and talk to one another to enhance collaboration and communication skills.</p>	<p>GESI: Working with each other in an inclusive way, cross-sharing of knowledge and understanding between and amongst groups and individuals, for instance, leads to:</p> <ul style="list-style-type: none"> • respecting individuals of different beliefs, religions, and cultures. • being sensitive to the inter-relatedness of the various spheres of life, groups, and individuals. • being aware of personal biases and stereotypes • embracing diversity and practice inclusion. <p>SEL: Learners having experienced a science pedagogy that ensures social and emotional learning skills (SELS) and working with each other will lead to:</p> <ul style="list-style-type: none"> • Providing opportunities for learners to practise communication skills (e.g., verbalising your message, listening to others.

		<ul style="list-style-type: none">• Encouraging learners to develop their own strategies for how to complete a task or learn a new concept to promote responsible decision-making.• Offer learners a range of strategies to help them manage their work (e.g., checklists, reminders, prompts). <p>National Core Values: Tolerance, friendliness, open-mindedness, patience, hard work, humility</p>
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Content Standards	Learning Indicators and Pedagogical Exemplars with 21st- Century Skills and GESI	Assessment
3.4.1.CS.1	3.4.1.LI.1	3.4.1.AS.1
Apply knowledge of human reproduction to understand heredity.	<p>Discuss heredity using traits observed in humans.</p> <p>Collaborative Learning:</p> <ol style="list-style-type: none"> 1. Put learners in mixed-ability groups to review reproduction in humans (from year 2). <ul style="list-style-type: none"> • Allow learners to discuss, through a whole class session, traits and features that make humans, plants, and animals look similar or different. • Using think-pair-share and guide learners to describe features of hereditary in humans with the aid of pictures, videos and models. 	<p>Level 1 Recall</p> <p>Level 2 Skills of conceptual understanding</p> <p>Level 3 Strategic reasoning</p> <p>Level 4 Extended critical thinking and reasoning</p>
	<p>3.4.1.LI.2</p> <p>Discuss hereditary diseases in humans.</p> <p>Talk for Learning and Exploratory Approach:</p> <ul style="list-style-type: none"> • Using Think-Pair-Share, discuss hereditary traits. • Explore hereditary diseases/disorders: sickle cell, haemophilia, diabetes, cleft lip and palate. <p>Note: Ensure that the language of teaching and interaction is devoid of stereotypes. Encourage learners to share experiences.</p>	<p>3.4.1.AS.2</p> <p>Level 1 Recall</p> <p>Level 2 Skills of conceptual understanding</p> <p>Level 3 Strategic reasoning</p> <p>Level 4 Extended critical thinking and reasoning</p>
Teaching and Learning Resources	<ul style="list-style-type: none"> • Pictures and wall charts. • Models and videos • Computer with modem 	

Content Standards	Learning Indicators and Pedagogical Exemplars with 21st- Century Skills and GESI	Assessment
3.4.1.CS.2	3.4.1.LI.1	3.4.1.AS.1
Explore and model sex determination in humans	<p>Draw Mendelian crossings to explain sex determination in humans.</p> <p>Diamond 9 approach:</p> <ul style="list-style-type: none"> Using the Diamond 9 Approach, allow learners to discuss their understanding of Mendelian crossing to show sex determination. Get learners to compare individual drawings with drawings on pictures, videos or charts and critique themselves. Using videos and pictures, put learners into groups to discuss and draw some Mendelian crossings and explain how this show exemplifies sex determination. 	Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning
	3.4.1.LI.2	3.4.1.AS.2
	<p>Explore selected traits in humans using applications of Mendelian crossing.</p> <p>Talk for Learning: In mixed-ability groups, learners select genes represented by letters of the alphabet and use them to draw Mendelian crossings for the following traits: height, skin colour, baldness, etc.</p>	Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning
Teaching and Learning Resources	<ul style="list-style-type: none"> Wall charts Books Pictures and videos on Mendelian crossing. 	

Subject **GENERALSCIENCE**
Strand **4. RELATIONSHIPS WITH THE ENVIRONMENT**
Sub-Strand **2. TECHNOLOGY IN LOCAL INDUSTRIES**

Learning Outcomes	21st- Century Skills and Competencies	GESI, SEL and Shared National Values
<p>3.4.2.LO.1</p> <p>Evaluate the scientific processes involved in indigenous texture production and its economic importance.</p>	<ul style="list-style-type: none"> • Learners acquire digital literacy skills through the use of cameras and voice recording devices. • Communication and Collaboration skills are acquired through interactions with peers and industry workers. • Critical Thinking: Generation of ideas about the stages involved in gari processing. 	<p>GESI: Learners having experienced a science pedagogy that embeds or aligns gender equality and social inclusion and working in an inclusive way, cross-sharing knowledge and understanding among groups and individuals lead them to:</p> <ul style="list-style-type: none"> • gain respect for individuals of different backgrounds. • be sensitive to the inter-relatedness of the various spheres of life, groups, and individuals. • be aware of their own biases and stereotypes. • embrace diversity and practice inclusion. • identify and challenge traditional gender roles and stereotypes. <p>SEL: Learners having experienced a science pedagogy that ensures social and emotional learning skills (SELS) and working with each other will lead to:</p> <ul style="list-style-type: none"> • Helping expand learners' emotional vocabulary and their abilities to identify physical sensations related to feelings to create self-awareness.

		<ul style="list-style-type: none"> • Offering learners opportunities to set goals and work to achieve them to develop self-management. • Providing opportunities for learners to reflect on positive and negative choices in relationships and the consequences of each choice. • Offering learners choices about ways they can present their ideas for responsible decision-making. <p>National Core Values: Tolerance, friendliness, open-mindedness, patience, hard work, humility</p>
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Content Standards	Learning Indicators and Pedagogical Exemplars with 21st- Century Skills and GESI		Assessment
3.4.2.CS.1	3.4.2.LI.1		3.4.2.AS.1
Demonstrate knowledge of the scientific processes involved in gari production.	<p>Analyse the scientific processes involved in indigenous texture production.</p> <p>Experiential Learning:</p> <ul style="list-style-type: none"> • Visit a gari processing site in your locality to get first-hand information on how gari is produced. • Put learners in mixed-sex or mixed-ability groups to discuss their findings from the field trip and write reports. Provide opportunities for learners to actively listen to others' views. • Using diamond 9 discussion, learners enumerate the economic importance of gari and present ideas in class for discussion. 		Level 1 Recall Level 2 Skills of conceptual understanding Level 3 Strategic reasoning Level 4 Extended critical thinking and reasoning
Teaching and Learning Resources	<ul style="list-style-type: none"> • Camera • Voice recording device • Pen 	<ul style="list-style-type: none"> • Notebooks/pads. • Charts and pictures of people at a gari processing site 	