LESSON PLANS FOR JUNIOR HIGH SCHOOLS

SCIENCE

BASIC 9

TERM 1

- Weekly forecast
- Detailed lesson plans

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FIRST TERM COMPUTING LESSON NOTES – BASIC 9

SCHEME OF LEARNING – TERM 1

WEEKS	STRAND	SUB STRAND	INDICATORS	RESOURCES
1	Diversity of Matter	Materials	B9.1.1.1.1-2	Charts & Pictures
2	Diversity of Matter	Materials	B9.1.1.1.3 B9.1.1.2.1	Charts & Pictures
3	Diversity of Matter	Living Cells	B9.1.2.1.1-2	Charts & Pictures
4	Cycles	Earth science	B9.2.1.1.1-2	Charts & Pictures
5	Cycles	Life cycles of organisms	B9.2.2.1.1-2	Charts & Pictures
6	Cycles	Crop production B9.2.3.1	B9.2.3.1.1	Charts & Pictures
7	Cycles	Crop production B9.2.3.1	B9.2.3.1.1	Charts & Pictures
8	Cycles	Animal Production B9.2.4.1	B9.2.4.1.1 B9.2.4.2.1	Charts & Pictures
9	Systems	Human Body systems	B9.3.1.1.1	Charts & Pictures
10	Systems	Solar system B9.3.2.1	B9.3.2.1.1	Charts & Pictures
11	Systems	Ecosystem B9.3.3.1	B9.3.3.1.1	Charts & Pictures
12	Systems	Farming Systems B9.3.4.1	B9.3.4.1.1	Charts & Pictures

WEEK 1

Week Ending:	**DAY:**	**Subject:** Science	
Duration: 100mins		**Strand:** Diversity Of Matter	
Class: B9	**Class Size:**	**Sub Strand:** Materials	
Content Standard: B9.1.1.1 Show an understanding of formation of binary chemical compounds and their uses (Acids, Bases and Salts)	**Indicator:** B9.1.1.1.1 Identify by name binary chemical compounds and discuss their uses.	**Lesson:** 1 of 2	
Performance Indicator: Learners can identify by name binary chemical compounds and discuss their uses	**Core Competencies:** DL 5.3: CI 6.8: DL 5.1: CI 6.6:		
References: Science Curriculum Pg. 87			
Key words: Compound, Element, Chemical symbol, Binary compound			

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Provide a hint or riddle for one of the compounds you will discuss today, and have learners guess what it is. Example: "I season my food with this white powder, but it's not sugar. What am I?" Answer: Table Salt Share learning indicators and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Divide the learners into small groups. Provide each group with samples or images of the various materials. Ask learners to discuss and identify each material based on their prior knowledge. Once identified, provide the actual names of the compounds in each material: • Table salt: Sodium Chloride (NaCl) • Water: Dihydrogen Monoxide (H_2O) • Vinegar: Acetic Acid ($C_2H_4O_2$) Note: not binary but can be used for contrast • Fuel (example: gasoline): various hydrocarbons Note: complex mixture • Soap: Sodium or Potassium salts of fatty acids Note: varies by soap • Detergents: varies by detergent (Sodium dodecylbenzenesulfonate can be an example) • Marble: Calcium Carbonate ($CaCO_3$) • Fertilizers: varies (Ammonium nitrate NH_4NO_3 can be an example) Discuss the common uses of each material in our daily life. Now that learners know the names of the compounds, ask them to list the elements found in each.	Pictures and charts

	Example: Sodium Chloride (NaCl) contains Sodium (Na) and Chlorine (Cl). Have them write the chemical symbols next to each element's name. <u>Assessment</u>: 1. What is a compound? 2. What is the chemical symbol for Sodium? 3. Name a binary compound commonly found at home and list its elements. 4. Why is vinegar not considered a binary compound?	
PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	

Week Ending:	**DAY:**	**Subject:** Science	
Duration: 100mins		**Strand:** Diversity Of Matter	
Class: B9	**Class Size:**	**Sub Strand:** Materials	
Content Standard: B9.1.1.1 Show an understanding of formation of binary chemical compounds and their uses (Acids, Bases and Salts)	**Indicator:** B9.1.1.1.2 Discuss the formation of binary chemical compounds	**Lesson:** 2 of 2	
Performance Indicator: Learners can discuss the formation of binary chemical compounds	**Core Competencies:** DL 5.3: CI 6.8: DL 5.1: CI 6.6:		
References: Science Curriculum Pg. 87			
New words: Element, Molecule, Ion, Compound			

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Place a water molecule, salt crystal, a piece of iron, and a battery on different corners of a table. Ask: "What do these items have in common, and how might they be different on a microscopic level?" This will set the context for the lesson. Share learning indicators and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Using visuals, define each term: element, molecule, ion, and compound. Have learners categorize a list of items (like H2O, NaCl, Fe, Ca^{2+}) under the correct headings: element, molecule, ion, or compound. Review and clarify misconceptions Explain what binary compounds are, focusing on their formation. Teach learners how to write the molecular formula of binary compounds. Write the formulas for compounds such as water, carbon (IV) oxide, iron (II) sulphide, and magnesium oxide. Using a Venn diagram or a chart, have learners compare and contrast the properties of different binary chemical compounds based on their composition. Consider properties like solubility, conductivity, melting point, etc. Engage in a discussion about why certain compounds share properties and why some are vastly different. Provide learners with modeling kits or craft materials like colored balls (for atoms) and sticks (for bonds). <u>Assessment</u> 1. What is the primary difference between an element and a compound? 2. If a substance is made up of two types of atoms bonded together, is it a molecule or a compound? Justify your answer. 3. <u>Write the molecular formula for</u> iron (II) sulphide.	Pictures and charts

	4. Based on your models, how do the bonds in water differ from those in carbon (IV) oxide?	
PHASE 3: **REFLECTION**	Summarize the lesson by reiterating the importance of understanding the fundamental building blocks of matter. Emphasize the fascinating world of compounds and how even the tiniest differences can lead to vastly different properties. Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	

WEEK 2

Week Ending:	**DAY:**	**Subject:** Science	
Duration: 100mins		**Strand:** Diversity Of Matter	
Class: B9	**Class Size:**	**Sub Strand:** Materials	
Content Standard: B9.1.1.1 Show an understanding of formation of binary chemical compounds and their uses (Acids, Bases and Salts)	**Indicator:** B9.1.1.1.3 Describe the characteristics of common acids, bases and salts.	**Lesson:** 1 of 2	
Performance Indicator: Learners can describe the characteristics of common acids, bases and salts	**Core Competencies:** DL 5.3: CI 6.8: DL 5.1: CI 6.6:		
References: Science Curriculum Pg. 88			
New words: Acid, Base (or Alkali), Salt, pH Scale, Indicator			

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Display three unlabeled containers: one with vinegar, one with baking soda, and one with table salt. Ask students: "Can you guess which one is an acid, which one is a base, and which one is a salt?" Share learning indicators and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Divide students into small groups. Provide each group with a set of labeled samples (but not clearly marked as acid, base, or salt). Examples: lemon juice, soap solution, table salt. Equip each group with indicators like litmus paper. Ask each group to test each sample and classify them as an acid, base, or salt based on their observations and knowledge. Discuss the results as a class. Brainstorm learners to explain what acids, bases and salts are and give examples. *Acids are substances that can donate a proton (H^+) to another substance and usually have a pH less than 7. They taste sour, can turn blue litmus paper red, and react with bases to form water and a salt. Examples: Hydrochloric acid (HCl), sulfuric acid (H_2SO_4), citric acid (found in citrus fruits), and acetic acid (found in vinegar).* ***Bases** are substances that can accept a proton (H^+) and usually have a pH greater than 7. They feel slippery to the touch, can turn red litmus paper blue, and react with acids to form water and a salt. Alkalis are bases that are soluble in water.* *Examples: Sodium hydroxide (NaOH), potassium hydroxide (KOH), and magnesium hydroxide ($Mg(OH)_2$).* ***Salts** are ionic compounds formed by the neutralization reaction between an acid and a base. They are made up of cations (from the*	vinegar, baking soda, table salt

	base) and anions (from the acid) and can conduct electricity in molten or dissolved states. *Examples: Sodium chloride (NaCl), potassium nitrate (KNO_3), and magnesium sulfate ($MgSO_4$).* Provide each group with colored pH scale templates, markers, and a set of common substances (like orange juice, cleaning products, water, etc.). Ask them to use indicators (litmus paper or universal indicator solution) to test each substance and place them on their pH scale according to the results. Encourage groups to display and explain their pH scale models to the class. <u>Assessment</u> 1. What is the difference between an acid and a base in terms of pH value? 2. If a substance has a pH value of 7, how would you classify it? 3. Name a common indicator that can be used to test the nature of a substance. How does it show the difference between acids and bases? 4. If you have a solution that turns blue litmus paper red, how would you classify it?	
PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	

Week Ending:	**DAY:**	**Subject:** Science	
Duration: 100mins		**Strand:** Diversity Of Matter	
Class: B9	**Class Size:**	**Sub Strand:** Materials	
Content Standard: B9.1.1.2 Demonstrate knowledge of atomic bonding in the formation of chemical compounds	**Indicator:** B9.1.1.2.1 Recognize that chemical bond results from the attraction between atoms in a compound	**Lesson:** 2 of 2	
Performance Indicator: Learners can describe the attraction between atoms in a compound		**Core Competencies:** DL 5.3: CI 6.8: DL 5.1: CI 6.6:	
References: Science Curriculum Pg. 88			
New words: Chemical bond, Atom, Ionic bond, Covalent bond, Metallic bond			

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Show students a magnet and some iron filings. Ask them: "What makes these iron filings stick to the magnet?" After some discussion, segue into the concept of attraction between atoms, just as there's an attraction between the magnet and iron filings.. Share learning indicators and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Display diagrams and models illustrating ionic, covalent, and metallic bonds. Discuss the main characteristics of each bond type. Engage students in a matching activity where they match the bond type to its description. Using atomic structure diagrams, demonstrate how bonds form. For example, show how an atom donating an electron (like sodium) and an atom accepting an electron (like chlorine) form an ionic bond. Let students use physical bond models or kits to simulate bond formations, encouraging them to explain their understanding as they do so. Display samples or pictures of various substances. Ask students to identify the type of bonding in each substance based on their learning. Discuss the properties of each substance that make its bonding type evident (e.g., the conductivity of metals due to metallic bonding). <u>Assessment</u> 1. What is the main difference between ionic and covalent bonds in terms of electron transfer or sharing? 2. Which type of bond involves the 'sea of electrons' concept? 3. Why do you think metals are generally good conductors of electricity?	Diagrams showing atomic structures of different elements Pictures and charts

	4. Name a common substance for each type of bond: ionic, covalent, and metallic.	
PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	

WEEK 3

Week Ending:	**DAY:**	**Subject:** Science	
Duration: 100mins		**Strand:** Diversity Of Matter	
Class: B9	**Class Size:**	**Sub Strand:** Living Cells	
Content Standard: B9.1.2.1 Demonstrate knowledge of specialist cells of dicotyledonous plants and humans, their formation and functions for the existence of the plants and humans	**Indicator:** B9.1.2.1.1 Discuss the concepts of specialized cells and how they are formed in dicotyledonous plants and humans		**Lesson:** 1 of 2
Performance Indicator: Learners can discuss the concepts of specialized cells and how they are formed in dicotyledonous plants and humans		**Core Competencies:** DL 5.3: CI 6.8: DL 5.1: CI 6.6:	
References: Science Curriculum Pg. 90			
New words: Specialized Cells, Dicotyledonous, Differentiation, Tissues			

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Display a picture of a professional sports team. Ask learners why each player has a specific role or position. Draw an analogy between specialized team players and specialized cells in organisms. Share learning indicators and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Divide learners into small groups and ask them to brainstorm on what they think "specialized cells" might mean. Each group can share their definitions. Note the recurring ideas on the board to arrive at a class definition. Explain that dicotyledonous plants are a type of plant that starts with two leaves when they sprout. Discuss how these plants grow, their cells become specialized to perform certain functions. Examples include guard cells in the stomata for gas exchange, xylem cells for water transport, and phloem cells for sugar transport. Introduce the concept that humans start as a single cell, which divides and eventually differentiates into all the various cell types in our body. Give examples of human specialized cells such as red blood cells (for oxygen transport), nerve cells (for transmitting signals), and muscle cells (for movement). Hand out clay or play dough to the learners. Ask them to shape the clay into a model of a cell. <u>Assessment</u> 1. What are specialized cells?	Pictures and Charts

	2. Name one specialized cell in dicotyledonous plants and its function. 3. Name one specialized cell in humans and its function. 4. Why is cell differentiation important in multicellular organisms?	
PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	

Week Ending:	**DAY:**	**Subject:** Science
Duration: 100mins		**Strand:** Diversity Of Matter
Class: B9	**Class Size:**	**Sub Strand:** Living Cells

Content Standard:	**Indicator:**	**Lesson:**
B9.1.2.1 Demonstrate knowledge of specialist cells of dicotyledonous plants and humans, their formation and functions for the existence of the plants and humans	B9.1.2.1.2 Examine the functions of specialized cells in dicotyledonous plants such as epidermal, guard cells, cambium, xylem in relation to the existence of the plants.	1 of 2

Performance Indicator:	**Core Competencies:**
Learners can identify the functions of specialized cells in dicotyledonous plants, such as epidermal cells, guard cells, cambium, and xylem.	DL 5.3: CI 6.8: DL 5.1: CI 6.6:

References: Science Curriculum Pg. 90

New words: Epidermal Cells, Guard Cells, Cambium, Xylem

<table>
<tr><th>Phase/Duration</th><th>Learners Activities</th><th>Resources</th></tr>
<tr><td>PHASE 1: STARTER</td><td>Display a picture of a big machine or factory, composed of many parts, each with its specific function.

Ask learners to think about what would happen if one part stops working. Use this analogy to introduce the idea that plants, like machines, have specialized parts (cells) that ensure the plant functions effectively.

Share learning indicators and introduce the lesson.</td><td></td></tr>
<tr><td>PHASE 2: NEW LEARNING</td><td>Play a short video clip that gives a close-up view of dicotyledonous plant cells, particularly focusing on epidermal cells, guard cells, cambium, and xylem.

Have a discussion on the appearance of each cell type, ensuring that learners can identify each cell by name and appearance.

Divide the learners into four groups, assigning each group one of the specialized cell types.

Task each group to gather information on the functions of their assigned cell and how it contributes to the overall existence of the plant.

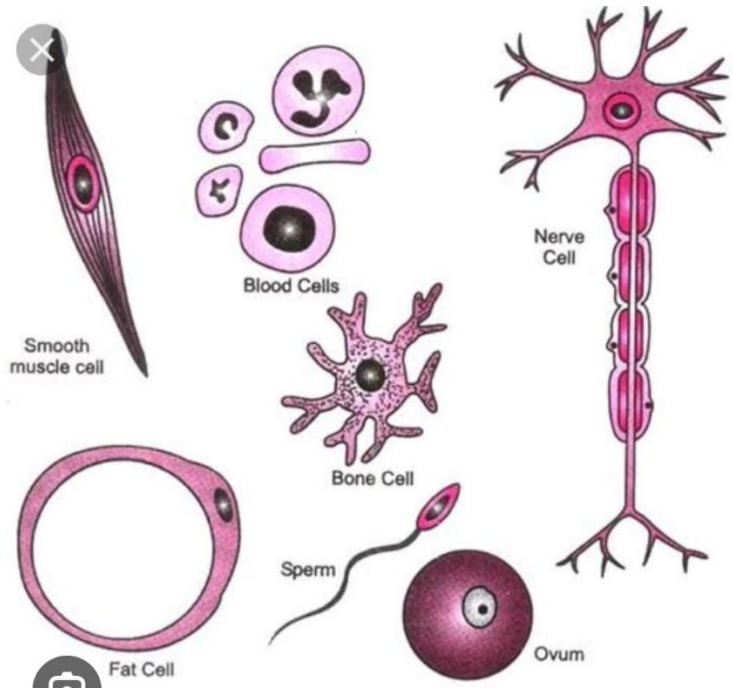
<table>
<tr><th>Cell</th><th>Function</th></tr>
<tr><td>Epidermal cells</td><td>• Protection: The primary function of epidermal cells is to protect the plant from water loss, mechanical injury, and infections.
• Regulation: Epidermal cells can also regulate gas exchange and water transpiration through tiny pores called stomata.
• Secretion: Some epidermal cells secrete a waxy layer called the cuticle which acts as a water-resistant barrier, further preventing excessive water loss.</td></tr>
</table>
</td><td>Pictures and Charts</td></tr>
</table>

	Guard Cells	• Regulation of Stomatal Opening: Guard cells surround each stoma (plural: stomata) on plant leaves and regulate their opening and closing. • Control of Gas Exchange: By adjusting the size of the stomatal pores, guard cells control the exchange of gases (like carbon dioxide and oxygen) between the plant leaves and the environment. • Water Regulation: The opening and closing of stomata also play a critical role in regulating water vapor loss (transpiration) from the plant.	
	Cambium	• Cell Production: The cambium is a type of meristem, and its primary function is cell production. It is responsible for producing new cells which can become part of the xylem, phloem, or more cambium. • Support and Growth: As the cambium produces cells, it contributes to the thickness (secondary growth) of stems and roots, strengthening the plant and allowing it to transport more nutrients and water.	
	Xylem	• Water and Nutrient Transport: Xylem's primary function is to transport water and dissolved nutrients from the roots to various parts of the plant. • Support: Xylem cells, once matured, become lignified (filled with lignin), which strengthens the cell walls and provides support to the plant. • Storage: Some xylem cells can also be involved in storing nutrients and water.	
	After research, each group should prepare a short presentation to share with the class. Facilitate a class discussion on the importance of each cell type in the overall health and survival of dicotyledonous plants. <u>Assessment</u> 1. What is the main function of guard cells in dicotyledonous plants? 2. Why are epidermal cells important for a plant? 3. How does the cambium contribute to a plant's growth? 4. Describe the role of xylem in dicotyledonous plants.		
PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.		

Week Ending:	**DAY:**	**Subject:** Science
Duration: 100mins		**Strand:** Diversity Of Matter
Class: B9	**Class Size:**	**Sub Strand:** Living Cells

Content Standard: B9.1.2.1 Demonstrate knowledge of specialist cells of dicotyledonous plants and humans, their formation and functions for the existence of the plants and humans	**Indicator:** B9.1.2.1.3 Examine the functions of specialized animal cells such as (nerve, blood cells, muscle cells and sperm cells) in relation to the existence of humans	**Lesson:** 1 of 2

Performance Indicator: Learners can recognize and identify specialized animal cells	**Core Competencies:** DL 5.3: CI 6.8: DL 5.1: CI 6.6:
References: Science Curriculum Pg. 91	
New words: Cell, Specialized, Observation, model	

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Begin by asking: "What do you think is the smallest unit that makes up our body?" Share learning indicators and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Display pictures and charts showcasing nerve cells, blood cells, muscle cells, and sperm cells.  Discuss their unique shapes and functions briefly as each is presented. Provide learners with modeling clay or play dough of various colors. Encourage learners to create 3D models of the specialized cells, mimicking the shapes they observed.	

	As they work, circulate the classroom and engage with them, prompting discussions about the unique features of each cell they're modeling. Ask learners to share their models and explain why they chose certain shapes and features for each cell. <u>Assessment</u> 1. Which cell has long extensions and is involved in transmitting information? 2. Which cell can be round and is responsible for transporting oxygen? 3. What might be the main function of muscle cells? 4. Why do you think sperm cells have a tail?	
PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	

Week Ending:	**DAY:**	**Subject:** Science
Duration: 100mins		**Strand:** Diversity Of Matter
Class: B9	**Class Size:**	**Sub Strand:** Living Cells

Content Standard: B9.1.2.1 Demonstrate knowledge of specialist cells of dicotyledonous plants and humans, their formation and functions for the existence of the plants and humans	**Indicator:** B9.1.2.1.3 Examine the functions of specialised animal cells such as (nerve, blood cells, muscle cells and sperm cells) in relation to the existence of humans	**Lesson:** 2 of 2
Performance Indicator: Learners can discuss the crucial roles specialized animal cells play in the overall existence and functioning of humans	**Core Competencies:** DL 5.3: CI 6.8: DL 5.1: CI 6.6:	
References: Science Curriculum Pg. 91		
New words: Existence, Function, Reaction, Specialized		

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Ask: "Can you think of how our body knows when our hand touches something hot?" Share learning indicators and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Brainstorm learners to discuss the functions of the specialized cells. • Nerve cells: Transmit signals and help in reactions. • Blood cells: Transport oxygen and nutrients, defend against diseases. • Muscle cells: Help in movement and maintaining posture. • Sperm cells: Play a role in human reproduction. Discuss how the specialized functions of these cells relate to everyday human activities and existence. Example: *Scenario: Sarah was baking cookies. As she reached inside the oven to retrieve the baking tray, she accidentally touched the hot metal. Almost immediately, she jerked her hand back.* *Explanation: Nerve cells, or neurons, in Sarah's hand transmitted a rapid signal to her brain indicating heat and potential harm. The brain then sent a signal back, prompting her muscles to react and pull her hand away. This entire process happened almost instantaneously, thanks to the specialized function of nerve cells that transmit signals efficiently.* Ask learners to think of a daily activity (like eating, running, or reading) and identify which specialized cells might be involved and why. Example: *After a long run, Tom felt exhausted and sat down to catch his breath. As he rested, he felt his heartbeat normalize and his breath become steady.* Learners can share their thoughts in pairs or small groups. Allow a few groups or pairs to share their daily activity and the cells they connected to that activity.	

	<u>Assessment</u> 1. Why is the shape of nerve cells important for their function? 2. How do muscle cells contribute to activities like eating or playing sports? 3. Why are blood cells crucial for our existence? 4. What is the unique function of sperm cells in human reproduction?	
PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	

WEEK 4

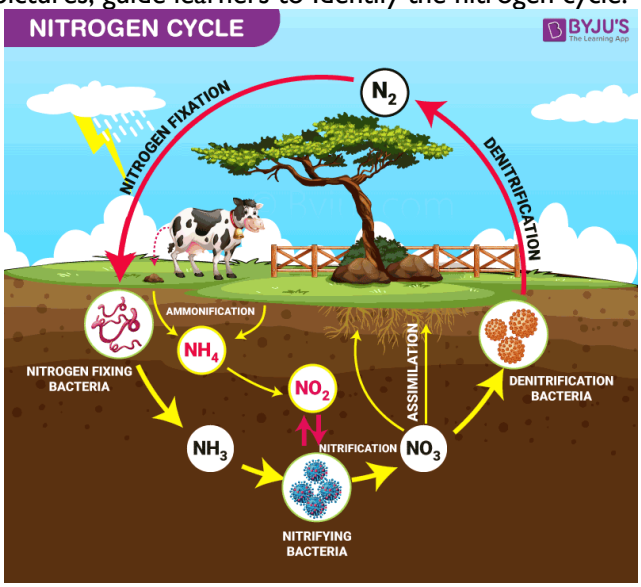
Week Ending:	**DAY:**	**Subject:** Science
Duration: 100mins		**Strand:** Cycles
Class: B9	**Class Size:**	**Sub Strand:** Earth science

Content Standard: B9.2.1.1 Demonstrate an understanding of the Nitrogen cycle as a repeated pattern of change in nature, and how it relates to the environment	**Indicator:** B9.2.1.1.1 Explain the process of the nitrogen cycle as a repeated pattern in nature	**Lesson:** 1 of 2

Performance Indicator: Learners can identify and understand the different stages of the nitrogen cycle. Learners can recognize the importance of the nitrogen cycle in the environment. Learners can explain why the nitrogen cycle is a recurring process in nature.	**Core Competencies:** Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC) Digital Literacy (DL), Creativity and Innovation (CI)

References: Science Curriculum Pg. 91

New words: Nitrogen Cycle, Nitrogen Fixation, Nitrification, Assimilation

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Display a picture of a healthy plant and a withered plant. Ask learners: "What do plants need to grow and stay healthy? What might be lacking in the withered plant?" Share learning indicators and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Using pictures, guide learners to Identify the nitrogen cycle.  Learners should identify and make notes on the key components and processes of the cycle. Explain the nitrogen cycle depicting processes such as: *1. Nitrogen Fixation: - Conversion of atmospheric nitrogen (N2) to ammonia (NH3) by specific bacteria or through abiotic processes like lightning.*	Pictures and charts

	2. Nitrification:- Two-step process where ammonia (NH3) is converted first to nitrite (NO2-) and then to nitrate (NO3-) by certain bacteria in the soil. *3. Assimilation:- Uptake and incorporation of nitrogen (often in the form of nitrate or ammonia) by plants to synthesize amino acids, proteins, and other organic molecules.* *4. Ammonification (or Mineralization):- Decomposition of organic nitrogenous matter (like dead plants and animals) by decomposers, resulting in the release of ammonia (NH3) back into the soil.* *5. Denitrification:- Conversion of nitrates (NO3-) and nitrites (NO2-) in the soil back to gaseous nitrogen (N2) or nitrous oxide (N2O) by certain bacteria, releasing it into the atmosphere.* Use visual aids like charts or diagrams to help learners understand each step. Discuss the role of bacteria and other organisms in these processes. Let learners explain the relationship between the nitrogen cycle and the environment. Example: ***Soil Fertility****: The nitrogen cycle plays a key role in maintaining soil fertility by ensuring a continuous supply of essential nitrogen compounds that plants need for growth.* ***Air Quality****: Denitrification releases nitrogen gases back to the atmosphere, maintaining a balance. However, excessive nitrogen can lead to the production of nitrous oxide, a greenhouse gas.* ***Water Quality****: Excessive nitrates due to agricultural runoff can contaminate water, leading to problems like eutrophication, which can cause algal blooms and deplete oxygen in water bodies.* Discuss how plants rely on the nitrogen present in the soil, and how animals rely on plants (and other animals) for their nitrogen needs. Emphasize the interconnectedness of all life forms and the environment within this cycle. <u>Assessment</u> 1. What is the purpose of nitrogen fixation in the nitrogen cycle? 2. During which process is ammonia converted into nitrates? 3. Why is the nitrogen cycle important for the environment? 4. How does the repeated pattern of the nitrogen cycle ensure balance in nature?	
PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	

Week Ending:	**DAY:**	**Subject:** Science
Duration: 100mins		**Strand:** Cycles
Class: B9	**Class Size:**	**Sub Strand:** Earth science

Content Standard: B9.2.1.1 Demonstrate an understanding of the Nitrogen cycle as a repeated pattern of change in nature, and how it relates to the environment	**Indicator:** B9.2.1.1.2 Describe the importance of the nitrogen cycle to the environment	**Lesson:** 2 of 2

Performance Indicator: Learners can understand the significance of nitrogen to the environment and recognize the role of certain plants, such as leguminous crops, in replenishing soil nitrogen.	**Core Competencies:** Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC) Digital Literacy (DL), Creativity and Innovation (CI)

References: Science Curriculum Pg. 91

New words: Nitrogen Cycle, Leguminous Crops, Leaching, Bush Burning

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Display pictures of thriving crops and barren fields. Ask learners: "Why do you think one field is lush and the other is barren? How might nitrogen play a role?" Share learning indicators and introduce the lesson.	
PHASE 2: **NEW LEARNING**	1. Describe the importance of nitrogen to the environment. 2. Carry out a project to show how certain plants such as leguminous crops can replenish nitrogen in the soil. 3. Predict what will happen if the nitrogen cycle is interrupted by actions such as leaching, bush burning, and destruction of leguminous plants Engage learners to describe the importance of nitrogen to the environment. Discuss how nitrogen is a critical component of amino acids, proteins, and DNA, which are essential for life. Highlight the fact that the atmosphere is about 78% nitrogen, but plants and animals can't directly use it in its gaseous form. Explain the need for the nitrogen cycle to convert atmospheric nitrogen into a usable form for plants and animals. Carry out a project to show how certain plants such as leguminous crops can replenish nitrogen in the soil. In groups, learners can plant leguminous crops in small pots. In another set of pots, plant non-leguminous crops. Observe growth over a period, noting differences. Research or discuss the role of nitrogen-fixing bacteria present in the roots of leguminous plants.	Pictures and charts

	Conclude by discussing how leguminous crops are beneficial to agriculture and the environment. Predict what will happen if the nitrogen cycle is interrupted by actions such as leaching, bush burning, and destruction of leguminous plants. Introduce each disruption (leaching, bush burning, and destruction of leguminous plants) one by one and ask learners to predict the effects. Guide the discussion toward understanding the fragility of the nitrogen cycle and the consequences of its interruption on soil fertility, crop production, and the broader ecosystem. <u>Assessment</u> 1. Why is nitrogen important for plants and animals? 2. How do leguminous crops aid in replenishing soil nitrogen? 3. What is the consequence of bush burning on the nitrogen cycle? 4. Predict an effect on the environment if leguminous plants are massively destroyed.	
PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	

WEEK 5

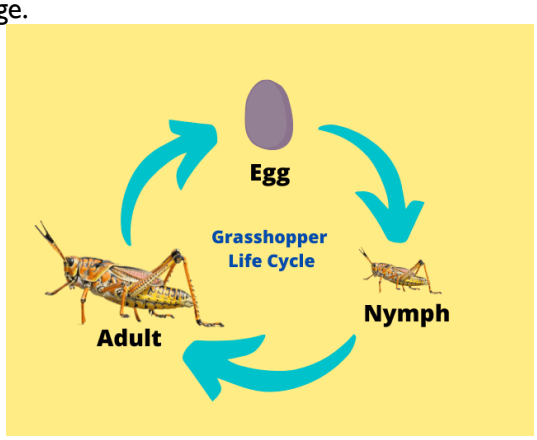
Week Ending:	**DAY:**	**Subject:** Science
Duration: 100mins		**Strand:** Cycles
Class: B9	**Class Size:**	**Sub Strand:** Life Cycles of Organisms

Content Standard: B9.2.2.1 Demonstrate an understanding of the life cycle of grasshopper and assess how their activities affect humans	**Indicator:** B9.2.2.1.1 Describe the life cycle of the grasshopper as a form of incomplete metamorphosis	**Lesson:** 1 of 2

Performance Indicator: Learners can describe the life cycle of the grasshopper and differentiate between incomplete and complete metamorphosis	**Core Competencies:** Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC) Digital Literacy (DL), Creativity and Innovation

References: Science Curriculum Pg. 91

New words: Incomplete Metamorphosis, Nymph, Life Cycle, Complete Metamorphosis

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Display two images side by side: one of a grasshopper nymph and the other of a caterpillar. Ask learners, "How do these two creatures grow into their adult forms?" This serves to intrigue learners about the different forms of metamorphosis. Share learning indicators and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Provide learners with paper, pencils, and coloring materials. Guide learners in drawing the life cycle of the grasshopper, from egg to nymph to adult. Emphasize the progression and differences at each stage.  Using the drawn life cycles, initiate a class discussion about the behavior of grasshoppers at each stage, such as the feeding habits of nymphs versus adults. Encourage learners to share any personal observations or experiences they've had with grasshoppers. Explain the concept of incomplete metamorphosis using the grasshopper as an example.	Pictures and charts

	Contrast this with complete metamorphosis, using examples like the housefly and mosquito. Highlight key differences, such as the absence of a pupal stage in incomplete metamorphosis. Facilitate a discussion on why these different life cycles might have evolved and the potential advantages of each. <u>Assessment</u> 1. What are the three main stages of the grasshopper's life cycle? 2. How does the behavior of a grasshopper nymph differ from that of an adult? 3. What stage is missing in the grasshopper's life cycle that makes it "incomplete" metamorphosis? 4. Can you name another insect that undergoes complete metamorphosis?	
PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	

Week Ending:	**DAY:**	**Subject:** Science
Duration: 100mins		**Strand:** Cycles
Class: B9	**Class Size:**	**Sub Strand:** Life Cycles of Organisms

Content Standard: B9.2.2.1 Demonstrate an understanding of the life cycle of grasshopper and assess how their activities affect humans	**Indicator:** B9.2.2.1.2 Examine how the activities of the grasshopper affect humans	**Lesson:** 2 of 2

Performance Indicator: Learners can describe the various activities of grasshoppers and evaluate their effects (both beneficial and harmful) on humans.	**Core Competencies:** Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC) Digital Literacy (DL), Creativity and Innovation

References: Science Curriculum Pg. 91

New words: Grasshopper Activities, Beneficial, Harmful, Impact

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Show a short video clip or images of a swarm of locusts (a type of grasshopper) ravaging crops. Pair this with an image of a single grasshopper in a natural setting. Ask, "How can this small insect have such a massive impact?" Share learning indicators and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Discuss the general behaviors and activities of grasshoppers in their natural habitats, emphasizing their diet, such as feeding on grasses and weeds. Highlight the difference between solitary grasshoppers and gregarious locusts to provide a broader context. Divide learners into groups and assign each group either a beneficial or harmful activity of grasshoppers related to humans. Each group conducts a brief research (using books, internet, etc.) to gather more details on their assigned topic. For instance, one group could research how grasshoppers can serve as a food source in certain cultures (beneficial) while another could delve into their role in agricultural destruction (harmful). Based on the research, each group will brainstorm and list down activities or strategies that either promote the beneficial impacts or reduce the harmful effects of grasshoppers on humans. For instance, for the beneficial aspect of grasshoppers as a food source, a group might suggest promoting grasshopper farming. On the harmful side, suggestions could include natural pest control methods to protect crops. Groups present their findings and suggested activities to the class. Facilitate a class discussion to consolidate learning and share different perspectives.	Pictures and charts

	<u>Assessment</u> 1. What are some typical activities of grasshoppers in their natural environment? 2. Name one beneficial impact of grasshoppers on humans. 3. How can grasshoppers be harmful to human activities? 4. Suggest one activity or strategy to mitigate the negative effects of grasshoppers on agriculture.	
PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	

WEEK 6

Week Ending:	**DAY:**	**Subject:** Science
Duration: 100mins		**Strand:** Cycles
Class: B9	**Class Size:**	**Sub Strand:** Crop production

Content Standard: B9.2.3.1 Show an understanding of differences in maturities of different crops grown in different soils and different seed beds	**Indicator:** B9.2.3.1.1 Observe and describe differences in maturation of crops grown in different soils and on different seed beds.	**Lesson:** 1 of 2

Performance Indicator: Learners can observe and record the maturation stages of different crops in various soils and seed beds.	**Core Competencies:** Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC) Digital Literacy (DL), Creativity and Innovation

References: Science Curriculum Pg. 96

Key words: Maturation Stages, Soil Influence, Seed Bed Impact, Soil Composition

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Begin the lesson with a brief discussion about the factors that influence plant growth. Ask learners to share their thoughts on what plants need to grow successfully. Emphasize the importance of these factors in the growth and maturity of crops. Share learning indicators and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Set up different stations with various soils and seed beds. Plant different crops in each station. Assign groups to each station. In their groups, learners observe and record the maturity stages of the crops in each station. They can use notebooks or observation sheets to document their findings. After a set time, rotate the groups to different stations, allowing learners to observe and record the maturity stages of different crops in various soils and seed beds. Have each group share their observations and recordings with the class. Discuss the differences in maturity stages among the different crops in different environments. Engage the class in a discussion about the impact of soil and seed bed variations on plant growth. Encourage learners to share their insights and draw connections between their observations and the key words introduced earlier. <u>Assessment</u> 1. "How did the different soils and seed beds influence the maturity stages of the crops you observed?"	Various crops (e.g., beans, corn, or radishes) Different types of soil (e.g., clay, sand, loam) Various seed beds (e.g., raised beds, traditional beds)

	2. "What patterns or similarities did you notice in the growth of crops in specific soil types or seed beds?" 3. "Reflect on the role of soil composition in supporting plant growth. How does it affect maturity stages?" 4. "In what ways does observing and recording crop maturity stages enhance our understanding of plant development and agricultural practices?"	
PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	

Week Ending:	**DAY:**	**Subject:** Science
Duration: 100mins		**Strand:** Cycles
Class: B9	**Class Size:**	**Sub Strand:** Crop production

Content Standard:	**Indicator:**	**Lesson:**
B9.2.3.1 Show an understanding of differences in maturities of different crops grown in different soils and different seed beds	B9.2.3.1.1 Observe and describe differences in maturation of crops grown in different soils and on different seed beds.	1 of 2

Performance Indicator:	**Core Competencies:**
Learners can compare and contrast the maturity stages of crops and seedlings in the community/school garden with those grown in external locations.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC) Digital Literacy (DL), Creativity and Innovation

References: Science Curriculum Pg. 96

Key words: Comparative Analysis, Environmental Factors, Community/School Garden

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Begin the lesson with a reflective question: "What factors do you think influence the growth and maturity of plants in our community/school garden?" Allow learners to share their thoughts and experiences. Share learning indicators and introduce the lesson.	
PHASE 2: **NEW LEARNING**	In small groups, provide learners with notebooks or observation sheets. Ask them to observe and record the maturity stages of crops and seedlings in the community/school garden. Visual Aids: Use visual aids, such as pictures or charts, to show images of crops and seedlings grown in external locations. Discuss the environmental factors that may influence their growth. Encourage groups to discuss and compare their observations with the images of crops from external locations. Learners should focus on similarities and differences in maturity stages and consider environmental factors. Each group shares their comparative analysis findings with the class. Encourage learners to articulate their observations and insights. Facilitate an open discussion where learners can ask questions, express opinions, and engage with their peers. Encourage critical thinking and deeper analysis of the factors influencing crop maturity. <u>Assessment</u> 1. "What similarities and differences did you observe in the maturity stages of crops in our community/school garden compared to external locations?"	Seeds or small plants from the community/school garden

	2. "Reflect on the impact of environmental factors on crop maturity. How do they contribute to the differences observed?" 3. "In what ways does a comparative analysis enhance our understanding of plant growth and environmental influences?" 4. "How might community or school initiatives improve the conditions for crop growth, considering what you've learned about external environments?"	
PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	

WEEK 7

Week Ending:	**DAY:**	**Subject:** Science
Duration: 100mins		**Strand:** Cycles
Class: B9	**Class Size:**	**Sub Strand:** Crop production

Content Standard: B9.2.3.2 Demonstrate knowledge and understanding of uses of different crops at different maturity stages	**Indicator:** B9.2.3.2.1 Observe and record the uses of different crops at different maturity stages	**Lesson:** 1 of 2

Performance Indicator: Learners can discuss and write about the uses of each maturity stage of identified crops.	**Core Competencies:** Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC) Digital Literacy

References: Science Curriculum Pg. 96

Key words: Maturity Stages, Utilization, Agricultural Products, Culinary

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Begin the lesson with a thought-provoking question: "Can you think of ways in which different stages of plant growth might be useful to us?" Allow learners to share their initial thoughts and experiences. Share learning indicators and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Define the term "maturity stages" in the context of crop development. Discuss the significance of each stage in the life cycle of a crop. Divide the class into small groups and assign each group a common crop (e.g., wheat, rice, tomato, maize). Instruct each group to research and discuss the uses of each maturity stage of their assigned crop. Groups create a visual representation or chart listing the uses at each stage. Each group presents their findings to the class, contributing to a collective chart on the board. <u>Assessment</u> 1. What environmental factors influence the germination stage, and how can farmers optimize them for better crop establishment? 2. How does nutrient management play a vital role in maximizing the vegetative stage, and what are the potential challenges in nutrient uptake?	Pictures and charts
PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	

Week Ending:	**DAY:**	**Subject:** Science
Duration: 100mins		**Strand:** Cycles
Class: B9	**Class Size:**	**Sub Strand:** Crop production

Content Standard:	**Indicator:**	**Lesson:**
B9.2.3.2 Demonstrate knowledge and understanding of uses of different crops at different maturity stages	B9.2.3.2.1 Observe and record the uses of different crops at different maturity stages	1 of 2

Performance Indicator:	**Core Competencies:**
Learners can categorize crops based on their different maturity stages and identify their uses.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC) Digital Literacy

References: Science Curriculum Pg. 96

Key words: Categorization, Crop Maturity Stages, Utilitarian, Collaborative Learning

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Begin the lesson with a visual stimulus: display images of crops in different maturity stages. Ask learners to describe what they observe and think about how the maturity stages might impact the uses of these crops. Share learning indicators and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Briefly review the concept of crop maturity stages and their importance in agriculture. Introduce the lesson's objective: to categorize crops based on their maturity stages and understand their uses. Discuss why it's valuable for farmers and agriculturalists to know the maturity stages of different crops. Provide information on various crops, including details about their maturity stages and common uses. Ensure diversity in the types of crops presented. Divide the class into small groups. Assign each group a set of crops to categorize based on their maturity stages and uses. Groups collaboratively categorize the assigned crops, creating charts or diagrams to represent their findings. Encourage discussions on the reasoning behind their categorizations. Each group presents their categorization to the class, explaining the rationale behind their decisions. Ask each student to write a brief reflection on the collaborative categorization activity. <u>Assessment</u> 1. "In what ways does categorizing crops by maturity stages and uses align with the utilitarian aspect of agriculture?"	Pictures and charts

	2. What are the key factors influencing successful pollination during the reproductive stage, and how can farmers enhance pollination efficiency? 3. How can farmers determine the optimal time for harvesting, and what factors contribute to the overall quality of the harvested crop?	
PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	

Week Ending:	**DAY:**	**Subject:** Science
Duration: 100mins		**Strand:** Cycles
Class: B9	**Class Size:**	**Sub Strand:** Crop production

Content Standard: B9.2.3.2 Demonstrate knowledge and understanding of uses of different crops at different maturity stages	**Indicator:** B9.2.3.2.2 Evaluate the importance of knowledge of maturity stages of different crops to human beings	**Lesson:** 1 of 2

Performance Indicator: Learners can evaluate the importance of knowledge about the maturity stages of different crops.	**Core Competencies:** Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC) Digital Literacy (DL), Creativity and Innovation

References: Science Curriculum Pg. 98

Key words: Agricultural Sustainability, Interdependence, Ecosystem Services, Holistic Perspective

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Begin the lesson with a thought-provoking question: "Why do you think it's important for farmers and gardeners to understand the different stages of a plant's growth?" Allow learners to share their initial thoughts and experiences. This will set the stage for discussing the importance of knowledge about crop maturity stages. Share learning indicators and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Define the term "crop maturity stages" and discuss the different stages (seedling, vegetative, flowering, fruiting, ripening). Explain that each stage has specific uses and benefits for humans, other crops, animals, and the environment. Present examples of different crops and discuss the specific uses and benefits at each maturity stage. Use the whiteboard or chart paper to create a visual representation. Break the class into small groups and provide each group with information on a specific crop. Instruct them to research and create a presentation on the uses of each maturity stage for humans, other crops, animals, and the environment. Each group presents their findings to the class, fostering a collective understanding of the diverse uses of crop maturity stages. Conduct a brief discussion on how climate and geographical factors can influence the timing of maturity stages in crops. Relate this information to the importance of selecting suitable crops for a specific region.	Pictures and charts, Information on various crops, maturity stages, and uses

	Assessment 1. How did considering the uses of each maturity stage from a holistic perspective contribute to your understanding of agricultural sustainability?" 2. In what ways do the uses of crop maturity stages illustrate the interdependence of humans, other crops, animals, and the environment?" 3. How might a farmer or gardener benefit from having a comprehensive understanding of the uses of different maturity stages in crop management?" 4. How do the uses of crop maturity stages contribute to the provision of ecosystem services?"	
PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	

Week Ending:	**DAY:**	**Subject:** Science
Duration: 100mins		**Strand:** Cycles
Class: B9	**Class Size:**	**Sub Strand:** Crop production

Content Standard: B9.2.3.2 Demonstrate knowledge and understanding of uses of different crops at different maturity stages	**Indicator:** B9.2.3.2.2 Evaluate the importance of knowledge of maturity stages of different crops to human beings	**Lesson:** 1 of 2

Performance Indicator: Learners can compare different stages of maturity of crops in the community with those used in other places	**Core Competencies:** Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC) Digital Literacy (DL), Creativity and Innovation

References: Science Curriculum Pg. 98

Key words: Agroecology, Optimization, Cultivar, Comparative Analysis

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Begin the lesson with a scenario-based question: "Imagine you are a farmer and have a choice of growing two different crops. What factors would you consider in selecting the crops to plant?" Allow learners to brainstorm and share their thoughts. Share learning indicators and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Provide information on various crops, including details about their maturity stages, growth conditions, and optimal uses. Divide the class into small groups. Assign each group a specific crop to explore in terms of maturity stages and crop management. Groups collaboratively explore and discuss how knowledge of the maturity stages of their assigned crop helps a farmer in crop selection, timing of harvest, and other aspects of crop management. Encourage a practical and agro ecological perspective. Each group presents their findings to the class, focusing on the practical applications of knowledge about crop maturity stages for crop management. Ask each student to write a brief reflection on what they learned about the role of maturity stages in crop management. How might this knowledge impact their decisions as a farmer? <u>Assessment</u> 1. How does knowledge of maturity stages contribute to effective crop selection and management?" 2. In what ways does understanding crop maturity stages align with the principles of agroecology?" 3. "How might a farmer benefit from optimizing crop management based on knowledge of maturity stages, especially in terms of harvest timing?" 4. Compare the crop management strategies discussed in your group with those of another group. What similarities or differences did you find?"	Pictures and charts, Samples of crops from the community

PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	

WEEK 8

Week Ending:	**DAY:**	**Subject:** Science
Duration: 100mins		**Strand:** Cycles
Class: B9	**Class Size:**	**Sub Strand:** Animal Production

Content Standard: B9.2.4.1 Demonstrate understanding of the preparation of feed for domestic and commercial animals	**Indicator:** B9.2.4.1.1 List the ingredients and the method of preparation of different feed for different domestic and commercial animals	**Lesson:** 1 of 2
Performance Indicator: Learners can formulate and prepare feed for domestic and commercial animals	**Core Competencies:** Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC) Digital Literacy (DL), Creativity and Innovation	
References: Science Curriculum Pg. 99		
Key words: preparation, domestic, commercial, ingredients		

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Revise with learners on the previous lesson using questions and answers. Share learning indicators and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Brainstorm the meaning of animal feed from learners. *Animal feed is essentially specially formulated food designed for domestic animals, especially livestock, to keep them healthy and productive.* Guide learners to identify and describe the types of animal feed • *Fodder: Concentrated feeds like grains, oilseed meals, and animal byproducts, often high in energy and protein. Think animal versions of protein bars!* • *Forage: Bulkier feeds like grasses, hay, and silage, providing fiber and essential nutrients. Imagine salad buffets for cows!* Learners in their groups give examples of animal feed. • *Corn, soybeans, and hay are common ingredients in commercial feeds.* • *Brewers' grains from beer production and leftover food scraps can also be used.* • *Animal feed plays a crucial role in modern agriculture, influencing the entire food chain.* Demonstrate how farmers prepare feed for different domestic and commercial animals with ingredients. Example: Chicken feed *Step 1: Milling:* • *Grains like corn, wheat, and soybeans are the primary ingredients.* • *Farmers grind these grains into smaller particles using large mill machines. Think giant coffee grinders!* *Step 2: Mixing:* • *The milled grains are then mixed with other ingredients like protein supplements, vitamins, minerals, and sometimes even antibiotics. Imagine a giant mixer tossing everything together!*	Pictures and charts

	Step 3: Pelleting (optional): • *For pelleted feed, the mash is moistened and fed into a pelleting machine, which forces it through dies with small holes, forming the pellets. Think of a pasta machine for chickens!* *Step 4: Cooling and drying:* • *Both mash and pellets need to be cooled and dried to prevent spoilage. This is often done using large conveyors with fans blowing cool air over the feed. Think of a giant salad spinner for chicken feed!* *Step 5: Storage:* • *The finished feed is then stored in silos or bins until it's ready to be used. Imagine giant chicken pantries!* Write down the process of preparing feed for different domestic and commercial animals with the ingredients. Compile a table, matching feed, ingredients and method of preparation. Formulate and prepare feed for domestic and commercial animals. <u>Assessment</u> 1. What are the two main types of animal feed, and how do they differ in terms of texture and nutritional value? 2. Why is animal feed important for modern agriculture, beyond just keeping animals fed? 3. Can you name some examples of common ingredients used in different types of animal feed, and explain their role in animal nutrition? 4. Imagine you're a farmer creating a special feed mix for your pigs. What factors would you consider when choosing the ingredients and their proportions?	
PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	

Week Ending:	**DAY:**	**Subject:** Science
Duration: 100mins		**Strand:** Cycles
Class: B9	**Class Size:**	**Sub Strand:** Animal Production

Content Standard: B9.2.4.2 Demonstrate skills and knowledge of feeding domestic and commercial animals	**Indicator:** B9.2.4.2.1 Describe and select appropriate feed for different domestic and commercial animals	**Lesson:** 1 of 2

Performance Indicator: Learners can describe and select appropriate feed for different domestic and commercial animals	**Core Competencies:** Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC) Digital Literacy (DL), Creativity and Innovation

References: Science Curriculum Pg. 99

Key words: Ruminants, Monogastrics, Nutrient Requirement, Feeding Practices

<table>
<tr><th>Phase/Duration</th><th>Learners Activities</th><th>Resources</th></tr>
<tr><td>PHASE 1:
STARTER</td><td>Revise with learners on the previous lesson using questions and answers.

Share learning indicators and introduce the lesson.</td><td></td></tr>
<tr><td>PHASE 2: NEW LEARNING</td><td>Divide learners into groups.

Let each group compile a list of feed commonly consumed by the different domestic and commercial animals in the environment.

<table>
<tr><th>Domestic Animals</th><th>Commercial Animals:</th></tr>
<tr><td>Dogs: Commercial kibble (dry or wet), raw or cooked meat and bones, vegetables, fruits (in moderation).</td><td>Cattle (Beef and Dairy): Hay, silage (fermented forage), grains (corn, barley, wheat), protein supplements like soybean meal</td></tr>
<tr><td>Cats: Commercial dry or wet food, cooked or raw meat (especially poultry), small amounts of canned tuna or salmon</td><td>Poultry (Chickens, Turkeys): Mash or pelleted feed with grains, protein sources like soybean meal, vitamins, minerals.</td></tr>
<tr><td>Horses: Hay, grains (oats, barley, corn), grass, vegetables, fruits</td><td>Pigs: Mash or pelleted feed with grains, protein sources like soybean meal, minerals, some fruits and vegetables.</td></tr>
<tr><td>Rabbits: Hay, pellets formulated for rabbits, leafy greens, carrots, herbs.</td><td>Sheep and Goats: Hay, pasture grazing, grains (oats, barley), minerals, occasional fruits and vegetables</td></tr>
<tr><td>Hamsters and Gerbils: Pellets designed for rodents, fresh vegetables, seeds, nuts (in moderation).
Birds: Seed mixes specific to bird species, fruits, vegetables, pellets formulated for birds</td><td>Fish: Pelleted feed containing grains, fish meal, vegetable oils, vitamins, minerals, tailored to specific fish species</td></tr>
</table>
</td><td>Pictures and charts</td></tr>
</table>

Guide learners to compare and contrast the characteristics of different kinds of feed commonly consumed by categories of domestic and commercial animals (ruminants, monogastrics, and poultry).

Have them record feed used to feed domestic and commercial animals on farms over a period of time.

Identify named samples of feed for three categories of domestic and commercial animals (ruminants, monogastrics, and poultry)

Ruminants

- *Forage: Grasses, legumes, and silages are the primary feed source for ruminants like cows, sheep, and goats. These provide essential fiber and nutrients for their digestive system.*
- *Concentrates: Grain-based feeds like corn, barley, and oats are often supplemented to provide additional energy and protein, especially during lactation or growth periods.*
- *By-products: Food industry by-products like beet pulp, citrus peel, and brewer's grains can be a cost-effective source of fiber and nutrients for ruminants.*

Monogastrics:

- *Grains: Cereals like corn, wheat, and barley are the main energy source for monogastric animals like pigs and poultry. They are often processed into pellets or mash for easier consumption.*
- *Protein sources: Soybeans, fish meal, and meat meal are crucial for providing essential amino acids that monogastric animals cannot synthesize themselves.*
- *Vitamins and minerals: Premixes containing essential vitamins and minerals are often added to monogastric feeds to ensure complete nutrition and prevent deficiencies.*

Poultry:

- *Starter crumbles: Finely ground feed with high protein content is essential for chicks during their initial growth phase.*
- *Grower mash: As chicks mature, their feed transitions to a coarser mash with balanced protein and energy levels for continued growth and development.*
- *Laying pellets: Hens require calcium-rich feed for strong eggshells and optimal egg production. Laying pellets are specially formulated to meet their nutritional needs.*

Assessment

1. Imagine you're feeding a young goat just starting to eat solid food. Which of the listed samples would be most appropriate and why?
2. Which category of animals (ruminants, monogastrics, or poultry) has the simplest digestive system, and how does their feed reflect that?
3. Beyond the listed samples, what are some unconventional or locally available feed options for any of the mentioned animal categories?
4. If you were formulating a new type of animal feed, what specific nutritional needs would you prioritize and why?

PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	

Week Ending:	**DAY:**	**Subject:** Science
Duration: 100mins		**Strand:** Cycles
Class: B9	**Class Size:**	**Sub Strand:** Animal Production

Content Standard: B9.2.4.2 Demonstrate skills and knowledge of feeding domestic and commercial animals	**Indicator:** B9.2.4.2.2 Differentiate between different types of feed for different stages of domestic and commercial animals.	**Lesson:** 1 of 2

Performance Indicator: Learners can categorize different types of animals based on their stages of growth (young, growing, and matured).	**Core Competencies:** Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC) Digital Literacy (DL), Creativity and Innovation

References: Science Curriculum Pg. 101

Key words: Ruminants, Monogastrics, Nutrient Requirement, Feeding Practices

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Begin the lesson with a question: "Can you think of different animals you've seen or heard about and describe how they change as they grow?" Allow students to share their thoughts and experiences. Share learning indicators and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Provide information on various animals, including details about their growth stages and typical nutrient requirements. Divide the class into small groups. Assign each group a specific category of animals (ruminants, monogastrics, or poultry) to focus on during the activity. Groups collaboratively categorize animals based on their stages of growth (young, growing, and matured). Additionally, they list the types of feed used for each growth stage. Each group presents their findings to the class, explaining the categorization and feeding practices for their assigned category of animals. Encourage discussions on the reasoning behind their choices. <u>Assessment</u> 1. How might understanding the growth stages of animals influence feeding strategies for farmers or animal caretakers?" 2. In what ways do the nutrient requirements of ruminants differ from those of monogastrics and poultry at various stages of growth?" 3. Compare the feeding practices discussed by your group with those of another group. What similarities or differences did you find?"	Pictures and charts
PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. <u>Take feedback from learners and summ</u>arize the lesson.	

Week Ending:	**DAY:**	**Subject:** Science
Duration: 100mins		**Strand:** Cycles
Class: B9	**Class Size:**	**Sub Strand:** Animal Production

Content Standard: B9.2.4.2 Demonstrate skills and knowledge of feeding domestic and commercial animals	**Indicator:** B9.2.4.2.2 Differentiate between different types of feed for different stages of domestic and commercial animals.	**Lesson:** 1 of 2

Performance Indicator: Learners can categorize different types of animals based on their stages of growth (young, growing, and matured).	**Core Competencies:** Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC) Digital Literacy (DL), Creativity and Innovation

References: Science Curriculum Pg. 101

Key words: Ruminants, Monogastrics, Nutrient Requirement, Feeding Practices

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Begin by asking students what they know about animal feed and its importance. Introduce the concept of different animal growth stages and how their nutritional needs change. Briefly discuss the three main animal categories (ruminants, monogastrics, and poultry) and their basic digestive systems. Share learning indicators and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Categorize different types of animals according to their stages of growth (young, growing and matured stages). Divide students into small groups. Show pictures of different animals at different growth stages (e.g., chick, young pig, adult cow). Present pictures of various types of feed (e.g., corn kernels, hay, fish meal, chick crumbles). Students, in their groups, must match the appropriate feed to each animal stage and explain their reasoning. Discuss the answers as a class, highlighting the changing needs of animals and the role of different feed components. Divide the class into three groups, each assigned a specific animal category (ruminants, monogastrics, poultry). Provide each group with pictures of their assigned animal at different stages and information about their digestive systems. Challenge each group to create a chart or diagram showing the major functions of feed in each growth stage for their assigned animal.	Pictures of different animals at different growth stages (e.g., chicks, puppies, calves, lambs) Pictures of various types of feed (e.g., hay, corn, fish meal, pellets)

	Groups present their findings to the class, explaining the changing role of feed through an animal's life. Show or discuss a case study of a local farm or animal production facility. Challenge students to analyze the types of feed used for different animals at the facility based on their growth stages and production goals. Encourage discussion about the importance of proper nutrition for animal health, welfare, and economic success. <u>Assessment</u> 1. Imagine you're feeding a young calf that's just been weaned off its mother's milk. Based on what you learned about feed functions and types, what kind of food would be most suitable for it and why? 2. Can you explain the difference in the main energy sources used by ruminants like cows and monogastrics like pigs? How does this relate to the types of feed they typically eat? 3. We learned about some common types of feed for different animals. Can you think of any examples of unconventional or locally available feed options that farmers might use in different parts of the world? 4. If you were designing a special food for animals living in cold climates, what nutrients would you prioritize and why? How might this differ from feed for animals in hot climates?	
PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	

Week Ending:	**DAY:**	**Subject:** Science
Duration: 100mins		**Strand:** Cycles
Class: B9	**Class Size:**	**Sub Strand:** Animal Production

Content Standard:	**Indicator:**	**Lesson:**
B9.2.4.2 Demonstrate skills and knowledge of feeding domestic and commercial animals	B9.2.4.2.3 Perform the feeding of domestic and commercial animals.	1 of 2

Performance Indicator:	**Core Competencies:**
Learners can observe and practice how to feed domestic and commercial animals at different growth stages.	Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC) Digital Literacy (DL), Creativity and Innovation

References: Science Curriculum Pg. 102

Key words:

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Briefly discuss the importance of proper feeding for animal health and production. Introduce the different animals they will encounter and their stages of growth. Emphasize safety guidelines and responsible interactions with the animals. Share learning indicators and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Divide students into small groups and assign each group to a specific animal. Provide information sheets about the assigned animal and discuss its feeding needs. Demonstrate proper feeding techniques, ensuring students understand portion sizes and hygiene practices. Allow students to take turns feeding the animals under adult supervision. Encourage them to observe the animals' behavior and reactions to the different feed types. Gather students as a group and discuss their observations. Ask questions about the different types of feed used, the animals' behavior, and any challenges they encountered. Relate the observed feeding practices to the information sheets and learning objectives. Facilitate a discussion about the importance of responsible animal husbandry and respecting animal welfare through proper feeding. <u>Assessment</u>	Access to a school farm or community farm with various animals at different stages (e.g., chickens, rabbits, cattle, goats) Appropriate protective gear (boots, gloves, hats) Buckets or feeding containers

	1. Imagine you're feeding a young chick and a grown hen at the farm. Both might eat chicken feed, but would the amount or type be different for each? Why or why not? 2. While observing, did you notice any differences in how the animals reacted to different types of feed? Describe what you saw and try to explain why they might prefer one over the other. 3. If you were helping the farmer prepare feed for the animals, what safety precautions would you remember? Share some important practices you learned during the visit. 4. Based on your experience, what do you think are some of the biggest challenges farmers face in ensuring proper nutrition for their animals? Discuss them with your classmates and brainstorm potential solutions.	
PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	

WEEK 9

Week Ending:	**DAY:**	**Subject:** Science
Duration: 100mins		**Strand:** Systems
Class: B9	**Class Size:**	**Sub Strand:** Human Body systems

Content Standard: B9.3.1.1 Demonstrate understanding of the blood circulatory system, health problems associated with the system and its relationship with the respiratory system in humans	**Indicator:** B9.3.1.1.1 Explain the concept of the circulatory system, state the function of each part of the system and the health challenges associated with it	**Lesson:** 1 of 2

Performance Indicator: Learners can describe the concept of the circulatory system, recognize the functions of each part, and identify potential health challenges related to the system.	**Core Competencies:** Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC) Digital Literacy (DL), Creativity and Innovation

References: Science Curriculum Pg. 102

New words: Circulatory System, Blood Composition, Heart, Blood Vessels

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Begin with a hands-on activity: ask learners to find their pulse (either on their wrist or neck). Once everyone has found their pulse, ask them, "What are you feeling? What makes this pulse happen?" Share learning indicators and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Introduce the circulatory system, explaining its primary function to transport blood throughout the body. Discuss the composition of blood: red blood cells, white blood cells, platelets, and plasma. Brainstorm learners for the role of each component. Using diagrams to illustrate the main parts of the circulatory system: the heart, blood vessels (arteries, veins, capillaries), and blood. Explain the function of each part: • Heart: pumps blood. • Arteries: carry blood away from the heart. • Veins: carry blood to the heart. • Capillaries: facilitate the exchange of oxygen and nutrients. Divide learners into small groups. Assign each group a part of the circulatory system or a component of blood. Each group creates a short presentation or skit, acting out or illustrating the function of their assigned part and its importance to the overall system.	Pictures and charts

	Briefly introduce common health challenges related to the circulatory system, such as high blood pressure, anemia, and coronary artery disease. Discuss potential causes and the importance of maintaining a healthy circulatory system. <u>Assessment</u> 1. What are the primary components of the circulatory system, and what does each component do? 2. Describe the composition of blood and the function of each component. 3. Why is the heart considered a crucial organ in the circulatory system? 4. Name one health challenge related to the circulatory system and explain its potential cause.	
PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	

Week Ending:	**DAY:**	**Subject:** Science
Duration: 100mins		**Strand:** Systems
Class: B9	**Class Size:**	**Sub Strand:** Human Body systems

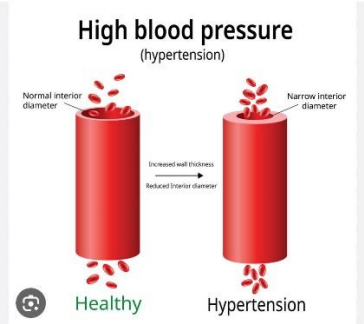
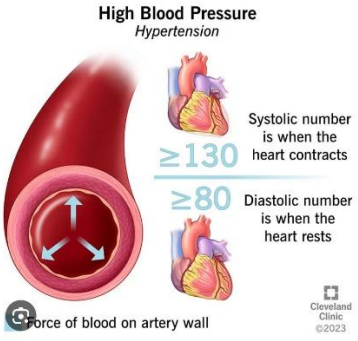
Content Standard: B9.3.1.1 Demonstrate understanding of the blood circulatory system, health problems associated with the system and its relationship with the respiratory system in humans	**Indicator:** B9.3.1.1.1 Explain the concept of the circulatory system, state the function of each part of the system and the health challenges associated with it	**Lesson:** 1 of 2

Performance Indicator: Learners can understand the intricacies of the circulatory system, including the detailed structure of the heart, health challenges related to the system, and concepts like blood pressure.	**Core Competencies:** Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC) Digital Literacy (DL), Creativity and Innovation

References: Science Curriculum Pg. 102

New words: Mammalian Heart, Blood Pressure, Circulatory Diseases, Prevention

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Show learners a brief video clip or animation of the circulatory system in action, emphasizing the heart pumping blood throughout the body. Pose the question: "What do you think happens when something goes wrong in this system?" Share learning indicators and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Distribute diagrams of the heart where learners can reference the structure. Guide learners in drawing and labeling the longitudinal section of a mammalian heart. Ensure they label key parts like the atria, ventricles, valves, and major blood vessels. Initiate a class discussion about diseases related to the circulatory system. Introduce common issues like atherosclerosis, heart attacks, strokes, and aneurysms. Discuss potential causes of these diseases, such as poor diet, lack of exercise, genetics, and smoking. Explain the concept of blood pressure, detailing systolic and diastolic pressures.	Pictures and charts

	  Discuss the significance of maintaining healthy blood pressure levels and potential problems associated with high or low blood pressure. Share ways of managing and maintaining healthy blood pressure, such as a balanced diet, regular exercise, and stress management techniques. Arrange learners into groups and assign each group one of the health challenges or prevention measures discussed. Ask groups to come up with a short skit, presentation, or poster to explain their topic to the class. <u>Assessment</u> 1. What are the main chambers of the mammalian heart, and what are their roles? 2. Name one disease of the circulatory system and its primary cause. 3. What is the difference between systolic and diastolic blood pressure? 4. List one way to manage or prevent high blood pressure.	
PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	

Week Ending:	**DAY:**	**Subject:** Science
Duration: 100mins		**Strand:** Systems
Class: B9	**Class Size:**	**Sub Strand:** Human Body systems

Content Standard: B9.3.1.1 Demonstrate understanding of the blood circulatory system, health problems associated with the system and its relationship with the respiratory system in humans	**Indicator:** B9.3.1.1.2 Explain the concept of respiration and show how the respiratory and circulatory systems complement each other.	**Lesson:** 1 of 2

Performance Indicator: Learners can explain the concept of respiration and demonstrate how the respiratory and circulatory systems complement each other.	**Core Competencies:** Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC) Digital Literacy (DL), Creativity and Innovation

References: Science Curriculum Pg. 102

New words: Respiration, Respiratory system, Circulatory, Glucose

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Begin with a thought-provoking question: "Why do you think we breathe, and what do you think happens inside our bodies when we do?" Allow learners to share their ideas. Share learning indicators and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Explain the concept of respiration Explain how deoxygenated blood from circulation is oxygenated through inhalation for respiration to take place. Define respiration as the process that occurs in our bodies to release energy from glucose and oxygen while producing carbon dioxide and water. Emphasize that this energy is essential for all the body's functions. Explain that the respiratory system, which includes the lungs, is responsible for the exchange of gases. Oxygen is inhaled, and carbon dioxide is exhaled. Discuss the importance of oxygen in the process of respiration. Introduce the circulatory system and its role in transporting oxygen and glucose to cells and removing carbon dioxide. Explain how the heart pumps blood throughout the body, ensuring that cells receive the necessary oxygen and nutrients.	Pictures and charts

	Provide a visual representation or a simple model to demonstrate how the respiratory and circulatory systems work together. Highlight the exchange of gases in the lungs and the transport of oxygen and nutrients through the blood. <u>Assessment</u> 1. What is respiration, and why is it important for our bodies? 2. How does the respiratory system contribute to the process of respiration? 3. Explain the role of the circulatory system in respiration and the transportation of essential substances. 4. Provide an example of how the respiratory and circulatory systems complement each other to support our daily activities	
PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	

Week Ending:	**DAY:**	**Subject:** Science
Duration: 100mins		**Strand:** Systems
Class: B9	**Class Size:**	**Sub Strand:** Human Body systems

Content Standard: B9.3.1.1 Demonstrate understanding of the blood circulatory system, health problems associated with the system and its relationship with the respiratory system in humans	**Indicator:** B9.3.1.1.2 Explain the concept of respiration and show how the respiratory and circulatory systems complement each other.	**Lesson:** 1 of 2

Performance Indicator: Learners can explain how deoxygenated blood is oxygenated through inhalation for the process of respiration to take place.	**Core Competencies:** Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC) Digital Literacy (DL), Creativity and Innovation

References: Science Curriculum Pg. 102

New words: Respiration, Respiratory system, Circulatory, Oxygenation

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Begin with a "Lung Model Exploration" activity. Show a simple model of the lungs and ask learners to observe it. Discuss what they already know about how breathing helps in oxygenating the blood. Share learning indicators and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Explain the basics of the respiratory system and its role in oxygenating the blood. Present a simple lung model for learners to observe. Engage learners in a discussion about what they already know about how breathing and the lungs work to oxygenate the blood. Use visual aids to depict the process. Provide a detailed explanation of how deoxygenated blood from circulation is oxygenated through inhalation. Use diagrams to illustrate the path of air and exchange of gases in the lungs. Conduct a hands-on demonstration where learners simulate the inhalation and exhalation process to better understand the exchange of gases. <u>Assessment</u> 1. What is the role of the respiratory system in the oxygenation of blood? 2. Can you explain how deoxygenated blood is oxygenated through inhalation? 3. Describe the path of air in the respiratory system and how it exchanges gases with the blood.	Pictures and charts

PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	

WEEK 10

Week Ending:	**DAY:**	**Subject:** Science
Duration: 100mins		**Strand:** Systems
Class: B9	**Class Size:**	**Sub Strand:** Solar system

Content Standard: B9.3.2.1 Demonstrate knowledge of other non-planetary bodies such as comets, asteroids, and their relationship with the solar system	**Indicator:** B9.3.2.1.1 Understand the movement of non-planetary bodies in the solar system.	**Lesson:** 1 of 2

Performance Indicator: Learners can identify and differentiate between asteroids and comets as non-planetary bodies in the solar system. Learners can understand the movement and potential risks posed by asteroids and comets.	**Core Competencies:** Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC) Digital Literacy (DL), Creativity and Innovation

References: Science Curriculum Pg. 103

Key words:

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Begin by asking learners what they know about the solar system. Introduce the concept of non-planetary bodies, including asteroids and comets. Show pictures or videos of asteroids and comets to familiarize learners with their visual characteristics. Share learning indicators and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Discuss the composition and location of asteroids, primarily in the asteroid belt between Mars and Jupiter. Explain the different types of asteroids based on their composition (carbonaceous, metallic, etc.). Discuss the potential risks posed by asteroids colliding with Earth, citing historical examples like the Tunguska event. Briefly mention asteroid mining as a potential future resource for humanity. Explain the composition and structure of comets, including the nucleus, coma, and tail. Discuss the role of ice and dust in the formation of comets and their iconic tails. Show how comets' orbits around the sun cause their tails to change and lengthen as they approach. Explain the connection between comets and meteor showers, citing examples like the Perseids or Geminids. <u>Assessment</u>	Pictures and charts Pictures, diagrams, or videos of asteroids and comets Models of the solar system (optional) Materials for a creative project (e.g., construction paper, paint, glitter)

	Challenge learners to create a visual representation of an asteroid or comet using available materials.	
PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	

Week Ending:	**DAY:**	**Subject:** Science
Duration: 100mins		**Strand:** Systems
Class: B9	**Class Size:**	**Sub Strand:** Solar system

Content Standard: B9.3.2.1 Demonstrate knowledge of other non-planetary bodies such as comets, asteroids, and their relationship with the solar system	**Indicator:** B9.3.2.1.1 Understand the movement of non-planetary bodies in the solar system.	**Lesson:** 1 of 2

Performance Indicator: Learners can compare and contrast the orbits, motions, and characteristics of asteroids and comets. Learners can appreciate the dynamic nature of the solar system and the role of movement in shaping its features.	**Core Competencies:** Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC) Digital Literacy (DL), Creativity and Innovation

References: Science Curriculum Pg. 103

Key words:

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Begin by reviewing learners' knowledge of the solar system and its various components. Introduce the concepts of asteroids and comets as non-planetary bodies with distinct movements. Briefly mention other non-planetary bodies like meteoroids and dwarf planets for context. Share learning indicators and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Show diagrams of the asteroid belt and typical comet orbits around the sun. Explain the elliptical nature of asteroid orbits, primarily concentrated between Mars and Jupiter. Discuss the highly eccentric and inclined orbits of comets, often taking them far beyond Pluto. Compare and contrast the orbital periods of asteroids and comets, emphasizing the shorter periods of many asteroids Divide learners into two groups: "Asteroids" and "Comets." Explain that each group will represent the typical motion of their assigned celestial body. Play excerpts of different types of music (fast, slow, chaotic, regular) and have each group move accordingly, mimicking the orbital characteristics of asteroids and comets. Discuss the differences in movement and how they relate to the orbital shapes and speeds of each body	Pictures and charts Diagrams and animations of the solar system, asteroid belt, and comet orbits Models of asteroids and comets, Crayons, markers, or other creative materials
PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	

Week Ending:	**DAY:**	**Subject:** Science
Duration: 100mins		**Strand:** Systems
Class: B9	**Class Size:**	**Sub Strand:** Solar system

Content Standard: B9.3.2.1 Demonstrate knowledge of other non-planetary bodies such as comets, asteroids, and their relationship with the solar system	**Indicator:** B9.3.2.1.1 Understand the movement of non-planetary bodies in the solar system.	**Lesson:** 1 of 2

Performance Indicator: Learners can compare and contrast the orbits, motions, and characteristics of asteroids and comets. Learners can appreciate the dynamic nature of the solar system and the role of movement in shaping its features.	**Core Competencies:** Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC) Digital Literacy (DL), Creativity and Innovation

References: Science Curriculum Pg. 103

Key words:

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Begin by reviewing learners' knowledge of the solar system and its various components. Introduce the concepts of asteroids and comets as non-planetary bodies with distinct movements. Briefly mention other non-planetary bodies like meteoroids and dwarf planets for context. Share learning indicators and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Provide learners with a worksheet containing a table with categories like "Orbit Shape," "Period," "Location," and "Composition" for both asteroids and comets. Challenge them to research and fill in the table, comparing and contrasting the main characteristics and movements of each type of non-planetary body. Introduce the concept of comet tails formed by dust and ice as the comet approaches the sun. Provide learners with creative materials like crayons, markers, and paper. Challenge them to design and illustrate different types of comet tails, considering the composition, length, and direction based on the comet's orbit. Allow learners to share their creations and explain their artistic choices about the comet tails.	Pictures and charts Diagrams and animations of the solar system, asteroid belt, and comet orbits Models of asteroids and comets, Crayons, markers, or other creative materials
PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	

WEEK 11

Week Ending:	**DAY:**	**Subject:** Science
Duration: 100mins		**Strand:** Systems
Class: B9	**Class Size:**	**Sub Strand:** Ecosystem

Content Standard: B9.3.3.1 Recognize the interdependence of organisms in an ecosystem and appreciate their interaction to maintain balance in the system	**Indicator:** B9.3.3.1.1 Conduct research into the composition of an ecosystem and discuss how the components depend on each other for survival.	**Lesson:** 1 of 1

Performance Indicator: Learners can differentiate between an ecosystem and a habitat and identify their key characteristics and appreciate the interconnectedness of life and the importance of maintaining healthy ecosystems.	**Core Competencies:** Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC) Digital Literacy (DL), Creativity and Innovation

References: Science Curriculum Pg. 104

Key words:

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Begin by asking learners what they know about different environments where plants and animals live. Introduce the concept of an ecosystem as a community of living organisms interacting with each other and their non-living environment. Show pictures of various ecosystems around the world to spark their curiosity and showcase diversity Share learning indicators and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Choose a specific ecosystem (e.g., a forest) and display related pictures of different organisms (trees, insects, birds, mammals). Explain the concept of interdependence and how organisms rely on each other for survival (food, shelter, pollination, etc.). Divide learners into small groups and provide them with yarn and construction paper. Challenge each group to create a web of interdependence, connecting pictures of organisms with yarn strands based on their interactions and dependencies. Encourage discussion within groups about the different relationships they identified and the overall web of life within the chosen ecosystem. Introduce the concept of a habitat as the specific place where an organism lives and finds its basic needs. Compare and contrast habitats with ecosystems, emphasizing the narrower focus on a specific organism's niche. Show pictures of different organisms and their corresponding habitats (e.g., a coral fish in a reef, a penguin on ice).	Pictures or diagrams of various ecosystems (forests, deserts, ponds, etc.) Pictures of different organisms within each ecosystem construction paper, yarn, markers, etc.

	Play a "Habitat Hideout" game where learners act as different organisms and race to find their corresponding habitat picture based on clues about their needs and adaptations. Discuss the diversity of habitats and their importance in providing suitable conditions for different organisms to thrive. Provide learners with the worksheet containing pictures and descriptions of different ecosystems. Challenge them to identify the organisms, their interactions, and the key characteristics of each ecosystem. Have learners answer questions on the worksheet about interdependence, food webs, and potential threats to these ecosystems. Encourage group discussion and collaboration to analyze the information and understand the complex dynamics within each ecosystem <u>Assessment</u> Divide learners into groups and assign each group a different ecosystem they studied. Provide them with materials like construction paper, markers, and yarn to create a large collaborative mural of their assigned ecosystem. Challenge them to include diverse organisms, their interactions, and important features of the habitat. Allow time for creative expression and group teamwork to showcase their understanding of ecosystems and interdependence.	
PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	

Week Ending:	**DAY:**	**Subject:** Science
Duration: 100mins		**Strand:** Systems
Class: B9	**Class Size:**	**Sub Strand:** Ecosystem

Content Standard: B9.3.3.1 Recognize the interdependence of organisms in an ecosystem and appreciate their interaction to maintain balance in the system	**Indicator:** B9.3.3.1.1 Conduct research into the composition of an ecosystem and discuss how the components depend on each other for survival.	**Lesson:** 1 of 1

Performance Indicator: Learners can analyze and predict the impacts of various types of interference on ecosystem balance and understand the importance of maintaining the delicate balance in ecosystems for sustainable life.	**Core Competencies:** Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC) Digital Literacy (DL), Creativity and Innovation

References: Science Curriculum Pg. 104

Key words:

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Begin by asking learners what they know about food chains and how organisms depend on each other for food. Introduce the concept of an ecosystem as a web of interconnected food chains and explain the role of producers, consumers, and decomposers. Show pictures of different ecosystems and mention specific examples of food chains within each. Share learning indicators and introduce the lesson.	
PHASE 2: **NEW LEARNING**	Choose a specific ecosystem relevant to your location or learners' interest (e.g., a tropical rainforest, a coral reef, a grassland). Divide learners into small groups and provide them with food chain and food web templates. Challenge each group to research and construct a simple food chain within their assigned ecosystem, identifying producers, consumers, and decomposers. Encourage them to connect multiple food chains into a complex food web, illustrating the interconnectedness of organisms and energy flow. Have groups share their created food chains and webs, discussing the relationships between organisms and the overall ecosystem balance. Introduce the concept of ecosystem balance and its importance for the survival of all living organisms. Present the list of potential interferences (earthquake, volcanic eruptions, hunting, farming, mining, "galamsey," pollution, pesticides, bush burning). Divide the class into small groups and assign each group a specific interference.	Pictures or diagrams of different ecosystems (forests, oceans, etc.) Food chain and food web templates List of potential ecosystem interferences (earthquake, volcanic eruptions, hunting, farming, mining, "galamsey," pollution, pesticides, bush burning)

	Provide them with the worksheet containing questions about the potential impacts of their assigned interference on different components of the chosen ecosystem and its overall balance. Challenge learners to analyze the impacts on producers, consumers, decomposers, food chains, and the web as a whole. Encourage group discussion and collaborative analysis to predict the consequences and potential long-term effects on the ecosystem. <u>Assessment</u> Organize a debate on the topic: "Development vs. Conservation: Striking a Balance for a Sustainable Future."	
PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	

Week Ending:	**DAY:**	**Subject:** Science
Duration: 100mins		**Strand:** Systems
Class: B9	**Class Size:**	**Sub Strand:** Farming Systems

Content Standard: B9.3.4.1 Demonstrate knowledge and skills in the preparation of different types of manure from animal and plant waste	**Indicator:** B9.3.4.1.1 List and explain the different plant and animal waste used in preparing different types of manure	**Lesson:** 1 of 2

Performance Indicator: Learners can identify and write down the materials used in preparing manure and their sources	**Core Competencies:** Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC) Digital Literacy (DL), Creativity and Innovation

References: Science Curriculum Pg. 105

Key words: Animal Manure, Green Manure, Compost, Organic Matter, Nitrogen, Carbon

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Begin the lesson by asking learners if they know what manure is and why it is important for farming. Introduce the concept of manure as organic matter used to fertilize soil and improve crop growth.	
PHASE 2: **NEW LEARNING**	Discuss various types of manure used by farmers, such as: • Animal manure: Includes cow dung, chicken droppings, and horse manure. • Green manure: Composed of plant residues like crop residues or leguminous plants. • Compost: Decomposed organic matter from kitchen waste or garden debris. Explain the materials used in preparing manure, including: • Organic matter: Kitchen waste, crop residues, grass clippings. • Nitrogen sources: Animal droppings, leguminous plants. • Carbon sources: Straw, sawdust, dried leaves. Discuss the sources of these materials, such as farms, households, and garden waste. <u>Assessment</u> 1. List three types of manure used by farmers and describe their benefits for soil fertility. 2. Identify two materials used in preparing manure and explain where these materials can be sourced from. 3. Discuss the importance of using organic matter in agriculture and how it contributes to sustainable farming practices. 4. State one potential challenge or limitation of using manure as a fertilizer and suggest a solution	
PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	

Week Ending:	**DAY:**	**Subject:** Science
Duration: 100mins		**Strand:** Systems
Class: B9	**Class Size:**	**Sub Strand:** Farming Systems

Content Standard: B9.3.4.1 Demonstrate knowledge and skills in the preparation of different types of manure from animal and plant waste	**Indicator:** B9.3.4.1.1 List and explain the different plant and animal waste used in preparing different types of manure	**Lesson:** 1 of 2

Performance Indicator: Learners can list and explain the different plant and animal waste used in preparing different types of manure	**Core Competencies:** Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC) Digital Literacy (DL), Creativity and Innovation

References: Science Curriculum Pg. 105

Key words: Justification, Soil and Climate, Plant Wastes, Animal Wastes

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Ask learners if they know what manure is and why it is important for farming. Introduce the concept of manure as organic matter used to fertilize soil and improve crop growth.	
PHASE 2: **NEW LEARNING**	Explain the two main categories of manure: plant wastes and animal wastes. Discuss examples of manure from plant wastes (e.g., compost, green manure) and animal wastes (e.g., poultry droppings, cow dung). In small groups, have learners compile a list of plant parts/wastes and animal parts/wastes used to prepare manure. Examples of plant parts/wastes: Leaves, waste fruits, plant shavings, crop residues. Examples of animal parts/wastes: Poultry droppings, cow dung, pig dung, animal carcasses. Discuss the factors that influence the choice of manure, such as soil type, climate, and crop requirements. Provide examples and scenarios (e.g., sandy soil, dry climate, fruit orchard) and ask learners to justify the use of specific manures for each scenario. <u>Assessment</u> 1. Categorize the following types of manure into plant wastes or animal wastes: compost, poultry droppings, cow dung, green manure.	

	2. Compile a list of materials used to prepare manure, including plant parts/wastes and animal parts/wastes. 3. Justify the use of cow dung in a region with clayey soil and frequent rainfall. 4. Explain why compost may be preferred over poultry droppings in a vegetable garden.	
PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	

WEEK 12

Week Ending:	**DAY:**	**Subject:** Science
Duration: 100mins		**Strand:** Systems
Class: B9	**Class Size:**	**Sub Strand:** Farming Systems

Content Standard: B9.3.4.1 Demonstrate knowledge and skills in the preparation of different types of manure from animal and plant waste	**Indicator:** B9.3.4.1.2 Demonstrate the preparation of different types of manure	**Lesson:** 1 of 2

Performance Indicator: Learners can prepare manure from the different plant and animal wastes	**Core Competencies:** Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC) Digital Literacy (DL), Creativity and Innovation

References: Science Curriculum Pg. 106

Key words: Pictures of different plant and animal wastes (e.g., straw, leaves, manure)

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Show pictures of different plants and ask learners: What happens to plant waste after harvest? (e.g., leaves fall, stalks remain) Then, show pictures of animal waste. Ask: What happens to animal dung? Briefly introduce the concept of manure and its role in agriculture. Explain that manure is a natural fertilizer made from decomposed plant and animal waste.	
PHASE 2: **NEW LEARNING**	Divide learners into pairs or small groups. Ask them to brainstorm a list of different plant and animal wastes they can think of. Encourage them to consider waste materials from their own communities. As a class, create a large chart on the board with two sections: "Plant Waste" and "Animal Waste." Learners take turns suggesting waste materials and placing them in the appropriate category. Facilitate a discussion about how these plant and animal wastes can be used to make manure. Introduce the concept of composting as the process of decomposition. Explain that manure needs time, moisture, and air to decompose properly. Ask learners to consider the specific plant and animal wastes available in their community. Discuss how these locally available resources can be used to prepare manure effectively. Manure Using Animal Waste | Manure Using Plant Waste	

	• Gather animal manure from sources such as livestock farms, poultry farms, or stables. • Common types of animal waste used for manure include cow dung, horse manure, chicken droppings, and goat/sheep manure.	• Gather various types of plant waste such as grass clippings, leaves, pruned branches, vegetable scraps, and fruit peels. • Avoid using diseased plant materials or weeds with seeds to prevent potential issues in the compost.		
	• Place the collected animal waste in a compost bin or pile. • Add other organic materials such as straw, hay, leaves, or kitchen scraps to the compost pile to provide a balanced mix of carbon and nitrogen.	Shred or chop larger plant materials into smaller pieces to speed up the composting process and facilitate decomposition.		
	• Keep the compost pile moist but not waterlogged. Use a hose to water the pile occasionally if needed. • Turn the compost pile regularly using a pitchfork or compost turner to aerate it and promote decomposition.	• Create layers of alternating green (nitrogen-rich) and brown (carbon-rich) materials in a compost bin or pile. • Green materials include fresh plant waste, kitchen scraps, and coffee grounds. Brown materials include dried leaves, straw, and cardboard.		
	• Let the composting process take place over several weeks to months, depending on environmental conditions and the type of waste used. • During decomposition, microorganisms break down the organic matter into nutrient-rich compost.	• Keep the compost pile moist but not soggy. Water the pile as needed to maintain proper moisture levels. • Turn the compost pile regularly to aerate it and mix the materials, which helps speed up decomposition.		
	• Once the composted animal waste has turned into dark, crumbly material with an earthy smell, it is ready to use as manure. • Spread the composted manure over garden beds, fields, or plant containers to improve soil fertility and provide essential nutrients for plant growth.	• Let the composting process occur over several weeks to months, depending on factors like temperature and the size of the compost pile. • As the plant waste decomposes, it transforms into nutrient-rich compost suitable for use as manure.		

	• Once the composted plant waste has broken down into a dark, crumbly texture with an earthy smell, it is ready to use. • Spread the composted plant waste over garden beds, around trees and shrubs, or in vegetable patches to enrich the soil and promote healthy plant growth. Assessment 1. List 3 examples each of plant and animal waste that can be used to make manure. 2. Describe two benefits of using manure in agriculture	
PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	

Week Ending:	**DAY:**	**Subject:** Science
Duration: 100mins		**Strand:** Systems
Class: B9	**Class Size:**	**Sub Strand:** Farming Systems

Content Standard: B9.3.4.1 Demonstrate knowledge and skills in the preparation of different types of manure from animal and plant waste	**Indicator:** B9.3.4.1.3 Prepare different types of manure.	**Lesson:** 1 of 2
Performance Indicator: Learners can participate in the cleaning, sorting, and composting process for manure creation	**Core Competencies:** Critical Thinking and Problem Solving (CP), Communication and Collaboration (CC) Digital Literacy (DL), Creativity and Innovation	
References: Science Curriculum Pg. 106		
Key words: Manure, Composting, Curing		

Phase/Duration	Learners Activities	Resources
PHASE 1: **STARTER**	Briefly review the concept of manure and its importance as a natural fertilizer (from previous lesson or quick discussion). Show pictures or samples of different materials used for manure preparation (plant waste, animal waste). Ask learners: How can we turn these materials into something useful for our school garden?	
PHASE 2: **NEW LEARNING**	Ensure learners understand the importance of wearing gloves and masks while handling organic waste. Discuss proper lifting techniques to avoid injury. Learners collect plant and animal waste materials designated for the project, ensuring adherence to school safety guidelines. In a designated area, learners work in pairs to clean and sort the collected waste. This may involve removing unwanted materials like plastic or metal, and breaking down larger pieces of plant material. Learners help create the compost pile in the designated bin/area. Layer the cleaned and sorted plant and animal waste materials, ensuring a good mix of brown (carbon-rich) and green (nitrogen-rich) materials for optimal decomposition. Learners add water to the compost pile to maintain a moist but not soggy environment. If time allows, learners can participate in turning the compost pile with shovels or pitchforks every few weeks to aerate the materials and promote even decomposition. Explain that the compost pile needs time (usually several months) to decompose completely and become mature manure.	Safety Gear (gloves, masks) Shovels, Rakes, Pitchforks (appropriate for the number of learners) Wheelbarrows or buckets

	Briefly discuss how the finished manure can be used in the school garden to improve soil fertility and plant growth.	
PHASE 3: **REFLECTION**	Use peer discussion and effective questioning to find out from learners what they have learnt during the lesson. Take feedback from learners and summarize the lesson.	