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**WEEK 1: LESSON 1**

**Strand:** Mixtures, Elements, and Compounds

**Sub Strand:** Structure of the Atom

**Specific Learning Outcomes:**

**- By the end of the lesson, learners should be able to:**

1. Define the term "atom."

2. Describe the structure of the atom.

3. Draw a circle showing the general structure of an atom.

4. Acknowledge the significance of the structure of the atom.

**Key Inquiry Questions:**

- How is the structure of the atom important?

- What are the components of an atom?

**Learning Resources:**

- Digital devices (tablets/laptops)

- Charts showing atomic structure

- Learner's Book

- Lesson notes

**Organisation of Learning:**

**Introduction (5 minutes):**

1. Review Previous Lesson:

- Begin with a brief recap of what was covered in the last lesson related to mixtures, elements, and compounds.

- Engage learners by asking questions about key concepts discussed previously.

2. Guide Reading and Discussion:

- Direct students to relevant sections in their Learner’s Book and other resources.

- Encourage a short discussion about what they know concerning atoms, focusing on engaging the whole class with questions.

**Lesson Development (30 minutes):**

**Step 1:** Defining an Atom

- In pairs, learners will brainstorm the meaning of "atom."

- Students will use digital or print resources to research and write a concise definition.

**Step 2:** Exploring Atomic Structure

- Present the basic components of an atom: protons, neutrons, and electrons.

- Learners will engage in a group discussion to identify how these components contribute to the atom's overall structure.

**Step 3:** Diagram Illustration

- Each group will create a visual representation of an atom, showing its structure (nucleus with protons and neutrons, and surrounding electrons).

- They can use markers or digital drawing tools to make their diagrams clear and engaging.

**Step 4:** Presentation and Feedback

- Groups will present their diagrams to the class.

- Peers and the teacher will provide constructive feedback, highlighting aspects that were well-done or could be improved.

**Conclusion (5 minutes):**

- Summarize Key Points:

- Recap the definition of an atom and its structure.

- Reinforce the significance of understanding atomic structure in the study of chemistry.

- Interactive Activity:

- Conduct a quick quiz or “atomic trivia” where students can answer questions about atoms.

- Preview Next Session:

- Brief learners on the upcoming topic related to chemical reactions and the role of compounds, prompting them to think about how atoms combine.

**Extended Activities:**

- Research Project: Learners can choose an element from the periodic table and create a poster that includes its atomic structure, properties, and uses in everyday life.

- Atomic Model Creation: Using materials at home (like clay or Lego), students can create a 3D model of an atom and present it to the class.

- Interactive Web Resource: Students can explore educational websites or apps that simulate atomic structures for a more hands-on understanding.

**Teacher Self-Evaluation:**

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**WEEK 1: LESSON 2**

**Strand:** Mixtures, Elements, and Compounds

**Sub Strand:** Structure of the Atom

**Specific Learning Outcomes**

**- By the end of the lesson, learners should be able to:**

1. Differentiate between Atomic Number and Mass Number.

2. Determine the mass number of the twenty elements.

3. Prepare charts showing the mass number of the twenty elements.

4. Enjoy determining the mass number of elements.

**Key Inquiry Questions**

- What is the difference between Atomic Number and Mass Number?

- How do we determine the mass number of elements?

**Learning Resources:**

- Lesson notes

- Learner's textbook

- Charts

- Digital devices (computers/tablets)

**Organisation of Learning:**

**Introduction (5 minutes):**

- Begin by reviewing the previous lesson on atoms and their structure.

- Ask guiding questions to activate prior knowledge and lead learners to read and discuss relevant content from their textbooks about atomic number and mass number.

**Lesson Development (30 minutes):**

**Step 1:** Understanding Definitions

- In pairs, learners will use digital or print resources to define "Atomic Number" and "Mass Number."

- Encourage them to share their definitions with the class to build a clear understanding of each concept.

**Step 2:** Discussing Differences

- Still in pairs, learners will discuss the differences between Atomic Number and Mass Number.

- Each pair will create a Venn diagram on the board to visually represent the similarities and differences.

**Step 3:** Calculating Mass Numbers

- Provide learners with a list of twenty elements (e.g., Hydrogen, Helium, Lithium, etc.) with their atomic numbers.

- Learners will work together to calculate the mass number for each element by adding the number of protons (atomic number) and neutrons (which they will deduce or look up).

**Step 4:** Chart Preparation

- Finally, each group will prepare a chart that displays the twenty elements alongside their calculated mass numbers. These charts will be hung up in the classroom for reference.

**Conclusion (5 minutes):**

- Summarize the key points discussed: definition of Atomic Number and Mass Number, the calculation of mass numbers, and the significance of these concepts in understanding elements.

- Conduct an interactive quiz or game to reinforce main topics (e.g., "Quiz-Quiz-Trade" where students quiz each other on atomic vs. mass number).

- Preview upcoming topics, such as the significance of isotopes in relation to mass numbers and how it impacts the chemical behavior of elements.

**Extended Activities:**

- Individual Research Project: Assign students to explore additional elements not covered in class and present their findings—including atomic and mass numbers, and any interesting facts—on a poster.

- Mass Number Scavenger Hunt: Organize a classroom scavenger hunt where students find and identify everyday items that relate to specific elements and their mass numbers.

**Teacher Self-Evaluation:**

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**WEEK 1: LESSON 3**

**Strand:** Mixtures, Elements and Compounds

**Sub Strand:** Structure of the Atom

**Specific Learning Outcomes:**

**- By the end of the lesson, learners should be able to:**

1. Define the term "electron arrangement."

2. Draw the electron arrangement in atoms using dots and cross diagrams.

3. Show interest in drawing electron arrangements using dots or cross diagrams.

**Key Inquiry Question(s):**

- What is electron arrangement?

**Learning Resources:**

- Learner's books

- Lesson notes

- Digital devices

- Video clips

**Organisation of Learning:**

**Introduction (5 minutes):**

- Begin the class by reviewing the previous lesson focusing on atomic structure.

- Encourage learners to read and discuss relevant content from their books, emphasizing the definition of electron arrangement and its importance.

**Lesson Development (30 minutes):**

**Step 1:** Defining Electron Arrangement

- In pairs, students discuss and write down their understanding of what electron arrangement means. The teacher circulates to provide guidance and clarification.

**Step 2:** Understanding Energy Levels

- Introduce the concept of energy levels. Use a simple diagram to explain the arrangement of electrons in different energy levels (shells). Encourage students to ask questions for better understanding.

**Step 3:** Video Demonstration

- Present a short video clip showing how to draw electron arrangements. Focus on using dots and crosses to represent electrons, making the learning more engaging and hands-on.

**Step 4:** Drawing Activity

- Guided by the teacher, learners practice drawing electron arrangements for different elements using both dots and crossings. Students can work in small groups to support each other and share their drawings.

**Conclusion (5 minutes):**

- Recap the key points discussed about electron arrangement, energy levels, and the drawing techniques learned.

- Conduct a quick interactive activity, such as a quiz or a pair-share session, where students can explain what they learned to one another.

- Preview the next lesson by posing questions about how electron arrangements affect the properties of elements.

**Extended Activities:**

- Research Project: Students can choose an element and prepare a presentation about its electron arrangement and how that impacts its properties and uses.

- Creative Drawing: Have students create a colorful poster illustrating various elements and their electron arrangements using dots and crosses.

-Online Simulation: Encourage students to use digital devices to access interactive simulations that allow them to manipulate electron arrangements and see their effects.

**Teacher Self-Evaluation:**

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**WEEK 1: LESSON 4**

**Strand:** Mixtures, Elements, and Compounds

**Sub Strand:** Structure of the Atom

**Specific Learning Outcomes:**

**- By the end of the lesson, the learner should be able to:**

1. Draw the electron arrangement of the twenty elements on charts and in their exercise books.

2. Enjoy the process of drawing the electron arrangement of different elements on the periodic table.

**Key Inquiry Question(s):**

- How do you draw the electron arrangement of elements?

**Learning Resources:**

- Learner's book

- Lesson notes

- Charts

- Marker pens

- Pair of compasses

- Circular objects (e.g., coins, lids)

**Organisation of Learning:**

**Introduction (5 minutes):**

- Review the previous lesson on the structure of atoms, reminding students of key concepts related to atomic structure and the periodic table.

- Guide learners to read selected sections from the learning resources that discuss electron arrangements, highlighting important points and encouraging discussion on their understanding of electron configurations.

**Lesson Development (30 minutes):**

**Step 1:** Class Discussion

- Start by explaining the concept of electron arrangement and its importance in understanding chemical behavior. Discuss the role of electrons in determining how atoms interact with each other.

**Step 2:** Demonstration

- Demonstrate how to draw the electron arrangement for elements using dots or crosses to represent electrons. Use one of the first twenty elements (for example, Carbon) to show how to identify the number of electrons and arrange them around the nucleus.

**Step 3:** Group Activity

- Divide the class into pairs or small groups. Each group will select a set of five elements from the first twenty in the periodic table. They will research and then collaboratively draw the electron arrangements of these elements on charts or in their exercise books, using dots or crosses.

**Step 4:** Presentation and Peer Feedback

- Each group will display their charts around the classroom. Groups will take turns to present their findings briefly, while other students will provide constructive feedback and ask questions based on what they learned.

**Conclusion (5 minutes):**

- Summarize key points discussed during the lesson, reiterating the importance of understanding electron arrangements.

- Conduct a brief interactive activity, such as a quick quiz or a game, to reinforce the main topics. For example, a 'matching' game where students match elements to their electron arrangements.

- Provide a brief overview of what they will learn in the next session, which will focus on the relationship between electron arrangements and chemical bonding.

**Extended Activities:**

- For homework, learners can choose an element from the periodic table and research its electron arrangement and significant properties. They can then create a small poster to present their findings, including information about how its electron arrangement affects its behavior in chemical reactions.

- Organize a "Periodic Table Scavenger Hunt" where students find samples and facts about various elements that they can relate back to electron configurations.

**Teacher Self-Evaluation:**

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**WEEK 1: LESSON 5**

**Strand:** Mixtures, Elements, and Compounds

**Sub Strand:** Structure of the Atom

**Specific Learning Outcomes:**

**- By the end of the lesson, students should be able to:**

1. Identify the feature used to distinguish metals and non-metals based on electron arrangement.

2. Explain how the number of valence electrons distinguishes metals from non-metals based on their tendency to lose or gain electrons.

3. Search for information on how to classify elements as metals or non-metals based on electron arrangement.

4. Acknowledge how one can easily classify elements as metals or non-metals.

**Key Inquiry Questions:**

- What are valence electrons?

- How can you distinguish metals and non-metals based on electron arrangement?

**Learning Resources:**

- Learner's book

- Lesson notes

- Digital devices (tablets/computers)

- Video clips on electron arrangement and classification

**Organisation of Learning:**

**Introduction (5 minutes):**

1. Review the Previous Lesson: Briefly discuss key points from the last class related to atoms and their basic structure.

2. Discussion: Ask students to share what they already know about metals and non-metals. Highlight the importance of valence electrons in determining these classifications.

**Lesson Development (30 minutes):**

**Step 1:** Finding Information

- In pairs, students will use digital devices to research what characteristics distinguish metals from non-metals.

- Encourage them to look specifically at electron arrangement and valence electrons.

**Step 2:** Group Discussion

- After research, students will regroup and share their findings.

- Facilitate a discussion on how the number of valence electrons influences whether an element is a metal or non-metal, focusing on their tendency to lose or gain electrons.

**Step 3:** Watch Clips

- Show video clips that illustrate the concept of electron arrangement and demonstrate how to distinguish between metals and non-metals visually.

**Step 4:** Classifying Elements

- Hand out a worksheet with examples of various elements.

- As a class, work through a few examples to classify them into metals or non-metals based on the information gathered.

**Conclusion (5 minutes):**

- Summarize Key Points: Recap what was learned regarding valence electrons and how they relate to the classification of metals and non-metals.

- Interactive Activity: Conduct a quick quiz game using a digital platform (like Kahoot) to reinforce understanding of key concepts.

- Preview Next Session: Briefly discuss what topics will be covered in the next lesson to build anticipation and curiosity. Ask students to think about the role of metals and non-metals in everyday life.

**Extended Activities:**

- Research Project: Assign students to pick two specific elements (one metal and one non-metal) and create a presentation about their properties, uses, and importance.

- Creative Classification: Have students create a colorful poster that illustrates the periodic table with a focus on metal and non-metal differentiation, including information about valence electrons for selected elements.

**Teacher Self-Evaluation:**

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**WEEK 2: LESSON 1**

**Strand:** Mixtures, Elements and Compounds

**Sub-Strand:** Structure of the Atom

**Specific Learning Outcomes:**

**- By the end of the lesson, the learner should be able to:**

1.Classify elements into metals and non-metals based on the electron arrangement.

2.Prepare charts showing the metals and non-metals elements.

3.Show interest in classifying elements into metals and non-metals.

**Key Inquiry Question(s):**

- How can you determine if an element is a metal or a non-metal?

**Learning Resources:**

- Lesson notes

- Charts (pre-prepared for demonstration)

- Learner's book

- Dots and cross diagrams of the twenty elements

**Organisation of Learning:**

**Introduction (5 minutes):**

- Review the previous lesson on parts of the atom and their functions.

- Guide learners to read and discuss relevant content from the learning resources, emphasizing the understanding of electron configurations.

**Lesson Development (30 minutes):**

**Step 1:** Review Electron Arrangement

- Briefly explain how the arrangement of electrons in an atom determines whether an element is a metal or non-metal.

- Use examples from the twenty elements and focus on their electron configurations.

**Step 2:** Group Classification

- In small groups or pairs, provide learners with electron arrangement data for the twenty elements.

- Have learners classify these elements into metals and non-metals based on the given information.

**Step 3:** Prepare Classification Charts

- Guide students in their groups to collect their classified elements and prepare a visual chart showing the metals and non-metals.

- Encourage creativity in presentation, such as using color coding or symbols for easy reference.

**Step 4:** Group Presentations

- Each group will present their charts to the class, explaining their reasoning behind the classifications.

- Facilitate questions and discussions about the different groups' methodologies.

**Conclusion (5 minutes):**

- Summarize key points: highlight how the arrangement of electrons helps classify elements and review examples of metals and non-metals.

- Conduct a brief interactive activity, such as a quick quiz or flashcard game, to reinforce the main topics discussed.

- Preview the next session by introducing the topic of chemical bonding and its relation to metals and non-metals.

**Extended Activities:**

- Element Research Project: Have students choose a metal or non-metal to research and create a presentation or poster about its properties, uses, and place on the periodic table.

- Interactive Electron Configuration Game: Use online resources or apps that allow students to build electron configurations and visualize how different elements fit into the categories of metals and non-metals.

- Create a 'Periodic Table' Art Piece: Encourage the students to design a creative periodic table that includes visual representations of metals on one side and non-metals on the other, including characteristics and uses.

**Teacher Self-Evaluation:**

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**WEEK 2: LESSON 2 - 3**

**Strand:** Mixtures, Elements, and Compounds

**Sub Strand:** Structure of the Atom

**Specific Learning Outcomes:**

**- By the end of the lesson, learners will be able to:**

1. Identify locally available materials to use in modeling the atomic structure of selected elements from the periodic table.

2. Model the atomic structure of selected elements using those materials.

3. Enjoy the process of modeling the atomic structure creatively and collaboratively.

**Key Inquiry Question:**

- Which locally available materials can you use to model the elements of the periodic table?

**Learning Resources:**

- Digital devices for research and presentation

- Environmental materials (e.g., cartons, buttons, beads, cardboards)

- Learner's textbook

**Organisation of Learning:**

**Introduction (5 minutes):**

- Teacher will review the previous lesson on atoms, emphasizing their importance as building blocks of matter.

- Learners will read a section in their textbooks about atomic structure and discuss key concepts in pairs.

**Lesson Development (30 minutes):**

**Step 1:** Brainstorming

- In small groups, learners will brainstorm and list locally available materials they could use to model the atomic structure.

Examples: buttons for electrons, cardboard for protons and neutrons.

**Step 2:** Collection of Materials

- Groups will gather the identified local materials from around the classroom or schoolyard.

**Step 3:** Model Creation

- Each group will collaboratively create a 3D model of an element's atomic structure, using the materials they’ve collected. They should choose at least one element from the periodic table.

**Step 4:** Presentation

- Groups will take turns presenting their models to the class, explaining the structure, including the number of protons, neutrons, and electrons, and how they represent the selected element.

**Conclusion (5 minutes):**

- Summarize the key points covered in the lesson: the structure of atoms, the identification of elements on the periodic table, and the collaborative model-making process.

- Conduct a brief interactive Q&A session, encouraging students to ask questions or share what they learned.

- Prepare learners for the next session by previewing the topic of chemical bonds and how atoms combine to form compounds.

**Extended Activities:**

- Research Project: Ask students to select an element from the periodic table and create an informational poster about its atomic structure and properties.

- Home Connection: Encourage students to find at least three items at home that could represent different subatomic particles and bring their ideas to the next class.

- Scientific History: Create a timeline project showing the discovery of atomic theory and key scientists who contributed to our understanding of the atom.

**Teacher Self-Evaluation:**

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**WEEK 2: LESSON 4**

**Strand:** Mixtures, Elements, and Compounds

**Sub Strand:** Structure of the Atom Assessment

**Specific Learning Outcomes:**

**- By the end of the lesson, the learner should be able to:**

1.Attempt questions on the sub-strand: Structure of the atom.

**Key Inquiry Question(s):**

- What are the main parts of an atom and their functions?

- How do elements differ from compounds based on atomic structure?

**Learning Resources:**

- Learner's Textbook

- Teacher's Assessment Questions Book

- Digital devices (e.g., tablets, computers for research)

**Organisation of Learning:**

**Introduction (5 minutes):**

- Review the previous lesson about mixtures, elements, and compounds.

- Engage learners in a brief discussion about their prior knowledge of atoms. Ask guiding questions such as: "What do you remember about the structure of an atom?"

- Guide learners to read and discuss relevant sections from the textbook, focusing on key concepts like protons, neutrons, electrons, and atomic structure.

**Lesson Development (30 minutes):**

**Step 1:** Identify Atomic Parts

- Begin by introducing the three main parts of an atom: protons, neutrons, and electrons. Use a diagram from the textbook to illustrate the atomic structure.

- Ask learners to work in pairs to label the parts of an atom on a printed diagram and discuss the function of each part.

**Step 2:** Explore Element vs. Compound

- Explain the difference between elements and compounds. Define what makes up each: elements are pure substances made of only one type of atom, while compounds are made of two or more different atoms bonded together.

- Pair learners again and provide them with a list of examples. They will categorize them into elements and compounds. Have them share their categorizations with the class.

**Step 3:** Conduct Inquiry-Based Assessment

- Distribute the Teacher's Assessment Questions Book filled with questions related to the structure of the atom.

- Have learners work individually to answer the questions, reinforcing their understanding. They should refer back to their textbooks as needed.

**Step 4:** Review and Reflect

- Bring the class back together for a brief discussion. Ask a few students to share their answers to the assessment questions.

- Clarify any misconceptions and reinforce key concepts that emerged during their discussions and activities.

**Conclusion (5 minutes):**

- Summarize the key points covered in the lesson, particularly the parts of the atom and the distinction between elements and compounds.

- Conduct a quick interactive activity, such as a "Quiz-Quiz-Trade" where students create questions based on the day's lesson to quiz each other.

- Preview the next session’s topic, encouraging learners to think about questions like, "How do atoms combine to form molecules?"

**Extended Activities:**

- Research Assignment: Have students research a specific element from the periodic table and prepare a multimedia presentation on its atomic structure, properties, and common compounds it forms.

- Model Building: Students can create 3D models of different atoms (both elements and compounds) using materials like clay, beads, or pipe cleaners to visualize atomic structure better.

- Interactive Atom Simulation: Use digital devices to explore online simulations that allow learners to manipulate and visualize atomic structure and electron configurations.

**Teacher Self-Evaluation:**

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**WEEK 2: LESSON 5**

**Strand:** Mixtures, Elements, and Compounds

**Sub Strand:** Metals and Alloys

**Specific Learning Outcomes:**

**- By the end of the lesson, learners should be able to:**

1.Identify the physical properties of metals.

2. Describe the physical properties of metals.

3.Search the internet for information on the physical properties of metals.

4.Acknowledge the physical properties of metals.

**Key Inquiry Questions:**

- What is a metal?

- What are the physical properties of metals?

**Learning Resources:**

- Lesson notes

- Learner's textbook

- Digital devices (computers/tablets)

- Charts

- Posters or flashcards

**Organisation of Learning:**

**Introduction (5 minutes):**

- Briefly review the previous lesson on elements and compounds.

- Ask learners to share what they remember and build on that knowledge.

- Introduce the key inquiry questions, guiding learners to find connections with their previous learning.

**Lesson Development (30 minutes):**

**Step 1:** Introduction to Metals

- Discuss what defines a metal. Highlight characteristics such as conductivity, malleability, and ductility.

- Share examples of common metals and their uses in everyday life.

**Step 2:** Group Research Activity

- Break the class into small groups or pairs.

- Assign each group to choose a metal or alloy (e.g., aluminum, copper, steel).

- Instruct groups to use digital or print resources to gather information on the physical properties of their selected metal or alloy.

**Step 3:** Group Discussion

- After research, each group discusses the physical properties they found, focusing on attributes like appearance, melting point, strength, etc.

- Encourage learners to think critically about how these properties affect the metal’s applications in real life.

**Step 4:** Presentation and Visual Aid Creation

- Groups will create posters or flashcards displaying the physical properties they researched.

- After preparing, ask each group to briefly present their findings to the class.

**Conclusion (5 minutes):**

- Summarize the key points addressed in the lesson, including defining metals and their physical properties.

- Conduct a brief interactive activity, such as a quick quiz or a game, to reinforce learning.

- Preview the next lesson, which will explore how the physical properties of metals affect their use in various industries.

**Extended Activities:**

- Metal Property Investigation:

Encourage students to gather different metal objects from home (e.g., aluminum foil, coins, utensils) and analyze their properties (weight, flexibility, etc.) in an additional homework assignment.

- Research Project:

Have students research a specific metal and create a short presentation or report on its importance in technology or everyday life, exploring historical and modern uses.

- Metals in Nature:

Organize a nature walk or a virtual tour focusing on where various metals are found in the environment and discuss the mining processes.

**Teacher Self-Evaluation:**

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**WEEK 3: LESSON 1**

**Strand:** Mixtures, Elements, and Compounds

**Sub Strand:** Metals and Alloys

**Specific Learning Outcomes:**

**- By the end of the lesson, the learner should be able to:**

1.Carry out experiments to demonstrate the physical properties of metals.

2. Learners will enjoy conducting experiments to determine the physical properties of metals.

**Key Inquiry Question:**

- Which experiment can you conduct to determine the physical properties of metals?

**Learning Resources:**

- Laboratory setup

- Experiment requirements (metals to test, tools, safety equipment)

- Learner's textbook

- Lesson notes

**Organisation of Learning:**

**Introduction (5 minutes):**

- Review the Previous Lesson: Quickly recap the concepts learned in the last class, such as the definition of elements, mixtures, and compounds.

- Discussion: Guide learners to read and discuss the relevant content from the provided resources, focusing on the physical properties of metals, such as conductivity, malleability, and ductility.

**Lesson Development (30 minutes):**

**Step 1:** Understand the Objective

- Instruction: Introduce the specific physical properties of metals. Explain what will be measured during the experiments (e.g., conductivity, flexibility, density).

- Group Formation: Divide the class into small groups of 4-5 students.

**Step 2:** Experiment Procedure Study

- Instructions: Each group will read the experiment procedure provided in the lesson notes. Assign the different physical properties each group will focus on testing. Ensure they understand the safety guidelines.

**Step 3:** Conduct Experiments

- Hands-On Activity: Groups will begin conducting their experiments. They should observe how metals respond and take notes on their findings. Encourage collaboration and help with any discrepancies in the process.

**Step 4:** Presentation and Discussion

- Group Sharing: Each group presents their findings to the class. Discuss what they observed regarding the physical properties of the metals. Encourage questions and seek connections to everyday applications of these properties.

**Conclusion (5 minutes):**

- Recap Key Points: Summarize the physical properties of metals discussed during the lesson. Reinforce how experimenting enhances understanding.

- Interactive Activity: Conduct a quick quiz or a matching game with key terms and definitions related to metals and their properties.

- Preview Next Session: Briefly discuss what will be covered in the next lesson and pique interest with thought-provoking questions about alloys.

**Extended Activities:**

- Research Project: Assign a project where students research a specific metal or alloy, focusing on its properties and real-world uses.

- Create a Poster: Have students create informative posters illustrating their findings on physical properties and applications of different metals. Display these in the classroom.

**Teacher Self-Evaluation:**

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**WEEK 3: LESSON 2**

**Strand:** Mixtures, Elements, and Compounds

**Sub-Strand:** Metals and Alloys

**Specific Learning Outcomes:**

**- By the end of the lesson, learners should be able to:**

1. Define the term "Alloys".

2. Describe the composition of various alloys.

3. Search the internet for information on the composition of common alloys.

4. Acknowledge the composition of common alloys.

**Key Inquiry Questions:**

- What is an Alloy?

- Which examples of alloys do you know?

**Learning Resources:**

- Lesson notes

- Digital devices (tablets or computers)

- Learner's Textbook

- Charts displaying types of alloys and their compositions

**Organisation of Learning:**

**Introduction (5 minutes):**

- Review: Start with a brief review of the previous lesson about mixtures and their components. Engage students by asking questions related to their prior knowledge about metals and their uses.

- Discussion: Guide learners to read a section from their textbooks that introduces alloys, encouraging them to share their thoughts and discuss the important terms, especially "alloy."

**Lesson Development (30 minutes):**

**Step 1:** Defining Alloys

- Activity: In groups, learners brainstorm the meaning of "alloy." Provide examples of alloys they know (e.g., steel, bronze, brass).

- Discussion: Each group shares their definition and examples with the class, fostering a collaborative learning environment.

**Step 2:** Composition of Alloys

- Activity: Introduce common alloys and distribute charts with examples. Discuss the primary elements that compose these alloys. Ask learners to identify the common elements in the examples.

- Group Work: Students work in pairs to further explore and note the properties of at least two alloys from the chart provided.

**Step 3:** Researching Alloys

- Activity: Guide learners to use their digital devices to search for the composition of common alloys not covered in class. Suggest they focus on the elements that make up each alloy and their applications.

**Step 4:** Sharing Findings

- Activity: Each pair presents their findings to the class, explaining the composition of the alloys they researched. Facilitate discussions about the significance of these alloys in everyday life.

**Conclusion (5 minutes):**

- Summary: Recap the key points discussed during the lesson and check for understanding.

- Interactive Activity: Play a quick game or quiz on key terms and concepts related to alloys, ensuring engagement and reinforcement of knowledge.

- Preview: Introduce the next lesson's topic, encouraging students to consider how alloys impact modern technology and engineering.

**Extended Activities:**

- Alloy Investigation Project: Assign students to choose an alloy and create a poster or digital presentation that details its composition, properties, uses, and any interesting facts they discover.

- Field Trip: Arrange for a visit to a local metalworks or manufacturer to see how alloys are produced and used.

- Experiment: Conduct a simple experiment using different metals to create a basic alloy (if feasible and safe) and observe the changes in physical properties.

**Teacher Self-Evaluation:**

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**WEEK 3: LESSON 3**

**Strand:** Mixtures, Elements, and Compounds

**Sub Strand:** Metals and Alloys

**Specific Learning Outcomes:**

**- By the end of the lesson, the learner should be able to:**

1. Identify the physical properties of common alloys.

2.Describe the physical properties of alloys.

3. Search the internet for information on physical properties of alloys.

4. Acknowledge the physical properties of alloys.

**Key Inquiry Question(s):**

- What are the physical properties of alloys?

**Learning Resources:**

- Lesson notes

- Learner's Textbook

- Charts

- Flashcards

- Digital devices (e.g., tablets or computers)

- Internet access

**Organisation of Learning:**

**Introduction (5 minutes):**

- Review the previous lesson on elements and compounds, highlighting key differences from alloys.

- Prompt students to read from their textbooks and discuss what they already know about alloys, encouraging them to connect prior knowledge with new concepts.

**Lesson Development (30 minutes):**

**Step 1:** Research

- In pairs, learners will use digital devices to search for information on the physical properties of different common alloys like brass, bronze, and stainless steel.

- Encourage the use of educational websites and reputable sources for accurate information.

**Step 2:** Identification

- After research, each pair will list at least three physical properties of the alloys they learned about (e.g., strength, corrosion resistance, malleability).

- Guide students to identify and discuss similarities or differences between the alloys' properties.

**Step 3:** Discussion

- Pairs will share their findings with the class, discussing the physical properties they identified.

- Facilitate the discussion by asking probing questions to deepen their understanding (e.g., "Why do you think stainless steel is used for kitchen utensils?").

**Step 4:** Creation

- Learners will create flashcards or charts based on the physical properties they discussed. Each flashcard should include the name of the alloy, its properties, and an image or diagram if possible.

- Encourage creativity in how they present their information.

**Conclusion (5 minutes):**

- Summarize the key points discussed during the lesson on the physical properties of alloys.

- Conduct a brief interactive quiz (raise hands or use polling apps) to reinforce learning outcomes or have a quick "think-pair-share" session.

- Preview the next lesson, which will focus on the applications of alloys in daily life and technology, prompting students to think about where they might encounter different alloys.

**Extended Activities:**

- Alloy Research Projects: Assign each student an alloy to research further and present to the class. They can cover its uses, how it's made, and its historical significance.

- Field Trip: If possible, organize a field trip to a local metalworking facility or a museum with metallurgical exhibits to see alloys in use.

- Creative Writing: Have students write a short story or skit that involves a scenario where alloys play a critical role (e.g., a blacksmith creating a new alloy or an engineer designing a car with specific alloy properties).

**Teacher Self-Evaluation:**

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**WEEK 3: LESSON 4**

**Strand:** Mixtures, Elements, and Compounds

**Sub Strand:** Metals and Alloys

**Specific Learning Outcomes:**

**- By the end of the lesson, learners should be able to:**

1. Identify the uses of different metals in day-to-day life.

2. Discuss the uses of various metals.

3. Prepare flashcards or charts showcasing the uses of the metals in society.

4. Appreciate the roles of different metals in society.

**Key Inquiry Question:**

- What are the uses of the different metals in the locality?

**Learning Resources:**

- Lesson notes

- Learner's textbook

- Digital devices (tablets/computers)

- Flashcards

- Pictures of items made from metals

- Charts

**Organisation of Learning:**

**Introduction (5 minutes):**

- Briefly review the previous lesson on mixtures, elements, and compounds, focusing on metals and their properties.

- Guide learners through reading and discussing relevant content from the learning resources, emphasizing the understanding of the significance of metals in everyday life.

**Lesson Development (30 minutes):**

**Step 1:** Brainstorming

- In pairs, learners brainstorm and list items made of metals found in their homes or communities. Encourage sharing ideas with the class to create a collective list on the board.

**Step 2:** Research

- Using print or digital resources, learners investigate the various uses of the metals identified in Step 1. Each pair selects a few metals to gather information on, focusing on common applications in society (e.g., construction, cooking, electronics).

**Step 3:** Discussion

- Groups come together to discuss their findings, highlighting the specific uses of metals. As a class, compile a more comprehensive list, ensuring that learners express their thoughts on why these uses are important.

**Step 4:** Flashcard/Chart Creation

- Each group prepares flashcards or a chart that visually displays the metals they researched along with their uses. These visuals will help reinforce their learning and provide an engaging resource to share with the class.

**Conclusion (5 minutes):**

- Summarize the key points discussed during the lesson, highlighting the different metals and their uses in society.

- Conduct a quick interactive activity, such as a "metal uses quiz," to reinforce the topics and check understanding.

- Prepare learners for the next session by previewing upcoming topics, related to the environmental impact of metal extraction and use.

**Extended Activities:**

- Metal Scavenger Hunt: Learners find various metal items at home and create a gallery to showcase them in the classroom.

- Create a Presentation: Each group selects one metal to create a short presentation that details its properties, uses, and importance in modern society.

- Field Trip or Virtual Tour: Arrange a visit to a local industry that uses metals or a virtual tour of a metal fabrication facility to see the applications in real-time.

**Teacher Self-Evaluation:**

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**WEEK 3: LESSON 5**

**Strand:** Mixtures, Elements, and Compounds

**Sub Strand:** Metals and Alloys

**Specific Learning Outcomes:**

**- By the end of the lesson, students should be able to:**

1. State the meaning of rust in metals.

2.Identify the causes of rusting in metals.

3. Describe the causes of rusting in metals.

4.Acknowledge the importance of understanding rusting in the environment.

**Key Inquiry Questions:**

- What is rust?

- What are the causes of rusting in the environment?

**Learning Resources:**

- Lesson notes

- Learner's Textbook

- Digital devices

- Video clips

- Rusted nails, iron objects, etc.

**Organisation of Learning:**

**Introduction (5 minutes):**

- Begin the lesson with a quick review of the previous topic on mixtures, elements, and compounds.

- Ask students to share any insights or questions they have from last week.

- Introduce the concept of rusting by asking students to observe real-life rusted items (like nails) that you have brought and discuss their observations.

**Lesson Development (30 minutes):**

**Step 1:** Observation and Discussion

- In groups of 3-4, students will closely observe the rusted items.

- Guide each group to brainstorm and write down what they think rust is and share their ideas with the class.

- Discuss their findings and summarize key points on the board.

**Step 2:** Research Causes of Rusting

- Assign each group to use digital devices or printed resources to find information about the causes of rusting.

- Encourage students to look for video clips that explain rusting and its environmental relevance.

- Each group should prepare a short presentation of their findings.

**Step 3:** Group Presentations

- Groups take turns presenting their findings on the causes of rusting.

- Encourage classmates to ask questions after each presentation.

- As a class, compile a comprehensive list of the causes of rusting.

**Step 4:** Discussing the Importance of Rust Awareness

- Facilitate a discussion on why it's important to understand rusting, especially concerning metal usage in everyday life.

- Ask students how they can prevent rusting in their own lives (proper storage, painting, using stainless steel, etc.).

**Conclusion (5 minutes):**

- Summarize the key points covered in the lesson, including the definition of rust and its causes.

- Conduct a brief interactive activity, such as a quiz or a quick game, to reinforce learning.

- Preview the next lesson by asking students to think about how different metals are used in construction and everyday objects.

**Extended Activities:**

- Research Project: Assign students to research a specific metal and its properties, uses, and how it can rust. Students can present their findings in the next class.

- Experiment: Conduct a simple experiment using different metals in water and salt to observe which metal rusts the fastest, discussing the results afterward.

- Field Study: Plan a field study to a local facility (e.g., a scrapyard or hardware store) to observe and learn about metal usage and rust management.

**Teacher Self-Evaluation:**

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**WEEK 4: LESSON 1**

**Strand:** Mixtures, Elements, and Compounds

**Sub Strand:** Metals and Alloys

**Specific Learning Outcomes:**

**- By the end of the lesson, learners should be able to:**

1.Carry out a simple experiment on the causes of rusting on metals.

2. Enjoy conducting the experiment on causes of rusting on metals.

**Key Inquiry Question:**

- What are your observations from the experiment on the causes of rusting?

**Learning Resources:**

- Nails

- Kitchen Oil

- Drying Agent (e.g., silica gel)

- Containers

- Water

- Laboratory

- Learner's Textbook

- Lesson Notes

**Organisation of Learning:**

**Introduction (5 minutes):**

- Begin with a quick review of the previous lesson about metals and their properties.

- Prompt students to read a section from their textbooks about rusting and engage in a brief discussion to ensure understanding. Highlight key concepts such as oxidation and the factors that contribute to rusting.

**Lesson Development (30 minutes):**

**Step 1:** Prepare for Experiment

- Divide students into small groups.

- Instruct groups to gather all the required materials: nails, containers, water, drying agents, and kitchen oil.

- Discuss the purpose of each material and the expected role it will play in the rusting experiment.

**Step 2:** Set Up the Experiment

- Guide each group to create two or three setups.

- Setup 1: Nail submerged in water.

- Setup 2: Nail coated with kitchen oil (no moisture).

- Setup 3: Nail placed with a drying agent (to observe the effect of dryness).

- Instruct students to ensure that at least one setup allows for moisture, and another prevents it, to compare outcomes.

**Step 3:** Observation

- After setting up the experiment, explain that students will observe their nails over several days.

- Instruct learners to carefully note any changes that occur in their experiment and discuss the differences between their setups.

**Step 4:** Discussion and Recording Observations

- After a few days (or in the following class), guide students to come together and share their findings.

- Facilitate a discussion on what they observed, asking specific questions about which nails rusted and which did not, and why they think this happened.

**Conclusion (5 minutes):**

- Summarize key points regarding the causes of rusting and the role of moisture, oxygen, and protective coatings like oil.

- Conduct a brief interactive quiz or discussion where students can share their observations and conclusions from the experiment, reinforcing their understanding.

- Preview the next lesson on prevention methods for rusting.

**Extended Activities:**

- Research Assignment: Have students research and prepare a short presentation on different methods used to prevent rusting in various industries (e.g., galvanization, painting).

- Creative Project: Encourage students to design a poster that visually represents the rusting process and ways to prevent it, using illustrations, diagrams, and infographics.

- Field Study: Organize a field trip to a local industrial facility where students can observe real-life applications and prevention of rusting in metals.

**Teacher Self-Evaluation:**

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**WEEK 4: LESSON 2**

**Strand:** Mixtures, Elements, and Compounds

**Sub Strand:** Metals and Alloys

**Specific Learning Outcomes:**

**- By the end of the lesson, the learner should be able to:**

1. State ways of controlling rusting of metals in the environment.

2. Discuss the different ways of controlling rusting on metals.

3. Search the internet for information on the ways of controlling rusting on metals.

4. Acknowledge the different ways of controlling rusting on metals.

**Key Inquiry Question:**

- Which ways can you use to control rusting on metals?

**Learning Resources:**

- Lesson notes

- Digital devices (tablets/laptops)

- Learner's Textbook

- Video clips

**Organization of Learning:**

**Introduction (5 minutes):**

- Review the previous lesson on metals and their properties.

- Guide learners to read and discuss relevant content from the lesson notes and textbook, emphasizing the importance of rusting and its effects on metals.

**Lesson Development (30 minutes):**

**Step 1:** Brainstorming

- Divide the class into small groups.

- Ask each group to brainstorm and list ways rusting can be controlled.

- Encourage them to write down their ideas on a sheet of paper.

**Step 2:** Research

- In their groups, learners will use digital devices to search for information about controlling rust.

- They can use credible websites or educational platforms to gather information.

- They should take notes on at least three different methods of rust control.

**Step 3:** Discussion

- Groups come together to share the methods they found during their research.

- Each group will present at least one method to the class, discussing its effectiveness and practicality.

**Step 4:** Reflection

- As a class, reflect on the methods discussed, considering which might be the most useful in different environments.

- Encourage learners to ask questions and clarify any uncertainties.

**Conclusion (5 minutes):**

- Summarize the key points covered during the lesson, highlighting the different ways to control rusting.

- Conduct an interactive activity, such as a quick quiz or "think-pair-share" to reinforce learning.

- Prepare learners for the next session by previewing upcoming topics, such as corrosion and its impact on structures.

**Extended Activities:**

- Project: Have students create a poster or digital presentation summarizing various ways to control rusting, including diagrams or images.

- Experiment: Conduct a simple experiment where students can observe rusting in real-time by placing iron nails in different environments (water, vinegar, saltwater) and hypothesizing the outcomes based on methods learned.

- Debate: Organize a classroom debate on the best method for controlling rust in different situations (e.g., household, industrial).

**Teacher Self-Evaluation:**

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**WEEK 4: LESSON 3**

**Strand:** Mixtures, Elements, and Compounds

**Sub Strand:** Metals and Alloys

**Specific Learning Outcomes:**

**- By the end of the lesson, learners should be able to:**

1. Identify examples of alloys used in day-to-day life.

2. Discuss the properties and uses of multiple alloys.

3. Prepare flashcards or charts that illustrate the uses of alloys.

4. Appreciate the importance of different alloys in everyday situations.

**Key Inquiry Questions:**

- What are the common uses of alloys in our locality?

- What items in our environment are made from alloys?

**Learning Resources:**

- Lesson notes

- Learner's Textbook

- Digital devices (optional for research)

- Charts and Flashcards

- Items made from alloys (e.g., coins, kitchen utensils)

- Pictures of various alloys and their uses

**Organisation of Learning:**

**Introduction (5 minutes):**

- Begin with a brief review of the previous lesson on metals and their properties.

- Ask students to share their knowledge about alloys. Key concepts to probe: What is an alloy? Why are alloys important?

- Introduce the day’s key inquiry questions to set the stage for the lesson.

**Lesson Development (30 minutes):**

**Step 1:** Item Identification

- In pairs, learners brainstorm and list items within their home or school made from alloys. Encourage them to think about common items like coins, keys, tools, and even jewelry.

**Step 2:** Research

- Guide students to use print or digital resources (such as textbooks or online encyclopedias) to find at least three common alloys and their specific uses. Examples could include:

- Steel (construction tools, beams)

- Brass (musical instruments, fittings)

- Bronze (statues, medals)

**Step 3:** Group Discussion

- Students discuss their findings within their pairs. They should share insights about how the properties of the alloys make them suitable for their uses (durability, corrosion resistance, etc.).

**Step 4:** Prepare Visuals

- Groups will create flashcards or charts summarizing the alloys they learned about, detailing their uses and any interesting facts. Encourage creativity in their presentations – they might use drawings, images from magazines, or printed pictures.

**Conclusion (5 minutes):**

- Summarize key points from the lesson, highlighting the importance of alloys in our daily lives.

- Conduct a quick interactive activity: Have a few students share their charts or flashcards with the class. Encourage questions and comments from peers.

- Introduce the next lesson on the properties of specific metals versus their alloys, emphasizing the inquiry questions to consider at home.

**Extended Activities:**

- Alloy Exploration Project: Assign students to find examples of alloys in various sectors (like automotive, construction, or art) and present their findings in a creative format (e.g., poster, slideshow).

- Virtual Field Trip: If resources allow, organize a virtual tour of a local factory or workshop that utilizes alloys and metals in its production process.

- Data Collection Assignment: Encourage students to survey family and friends about the alloys they use at home and report back in the next class.

**Teacher Self-Evaluation:**

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**WEEK 4: LESSON 4**

**Strand:** Mixtures, Elements, and Compounds

**Sub Strand:** Metals and Alloys

**Specific Learning Outcomes:**

**- By the end of the lesson, learners should be able to:**

1.Identify the effects of rusting on metals.

2. Discuss the effects of rusting on metals.

3.Search the internet for information on the effects of rusting on metals.

4.Acknowledge the effects of rusting on metals in the environment.

**Key Inquiry Question:**

- What are the effects of rusting on metals?

**Learning Resources:**

- Lesson notes

- Digital devices

- Learner's Textbook

- Rusted metallic objects (e.g., old nails, tools, etc.)

**Organisation of Learning:**

**Introduction (5 minutes):**

- Start with a quick review of the previous lesson on metals and their characteristics.

- Guide learners to read and discuss relevant content from the textbook regarding rusting, highlighting key concepts like oxidation and the conditions that cause rusting.

**Lesson Development (30 minutes):**

**Step 1:** Observation

- In pairs, learners will observe provided rusted metallic objects.

- Each pair should note the appearance of rust and discuss what they see.

**Step 2:** Identification

- Guide learners to identify and list the visible effects of rusting on the observed metals, such as color change, flaking, and structural weakening.

**Step 3:** Research

- Using digital devices or textbooks, learners will conduct a brief search for information on rusting.

- Groups will look for answers to the questions: "What causes rust?" and "What are the environmental impacts of rusting?"

**Step 4:** Discussion

- Facilitate a group discussion where each pair shares their findings with the class.

- As a class, discuss the environmental effects of rusting, including how rusting affects infrastructure, habitats, and human-made structures.

**Conclusion (5 minutes):**

- Summarize the key points about rusting: what it is, how it affects metals, the process, and its environmental impacts.

- Conduct a brief interactive activity, such as a 'think-pair-share', where each student shares one new fact they learned today about rusting.

- Wrap up by previewing what learners will explore in the next session, such as methods to prevent rusting.

**Extended Activities:**

- Research Project: Assign students to create posters or digital presentations on different ways to prevent rusting, focusing on various metals.

- Field Study: Organize a visit to a local site where rusting is commonly observed (e.g., a park, old buildings) to observe its effects firsthand and discuss prevention methods.

- Creative Writing: Have students write a short story or create a comic strip that illustrates the life cycle of a metal object, emphasizing the impact of rusting over time.

**Teacher Self-Evaluation:**

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**WEEK 4: LESSON 5**

**Strand:** Mixtures, Elements and Compounds

**Sub Strand:** Metals and Alloys; Assessment

**Specific Learning Outcomes:**

**- By the end of the lesson, the learner should be able to:**

1.Attempt assessment questions on the sub-strand: Metals and Alloys.

**Key Inquiry Question(s):**

- What are the properties that differentiate metals from non-metals?

- How are alloys formed and what are their advantages?

**Learning Resources:**

- Assessment books

- Learner's Textbook

- Teacher's Assessment Questions

**Organisation of Learning:**

**Introduction (5 minutes):**

- Begin the lesson by briefly reviewing the previous topic on elements and compounds.

- Highlight the importance of understanding metals and alloys in daily life and technology.

- Guide learners to read a selected excerpt from the textbook about metals and alloys, initiating a discussion about their characteristics and uses.

**Lesson Development (30 minutes):**

**Step 1:** Define Metals and Alloys

- Provide a clear definition of metals and what alloys are. Discuss examples of common metals (e.g., iron, aluminum) and common alloys (e.g., steel, brass).

- Engage learners by asking about items made from metals and alloys in their daily lives.

**Step 2:** Discuss Properties of Metals vs. Alloys

- Present the physical and chemical properties of metals, focusing on conductivity, malleability, ductility, and reactivity.

- Contrast these properties with those of alloys, discussing how combining metals can enhance certain characteristics.

**Step 3:** Group Activity on Properties

- In pairs, learners will group different metals and alloys, discussing their properties and applications. Each pair will take notes to help them answer assessment questions later.

- Encourage inquiry by asking pairs to consider the implications of these properties in real life.

**Step 4:** Individual Assessment Question Practice

- Distribute assessment questions focused on metals and alloys.

- Allow learners to work on the questions either individually or in pairs. Circulate the room to provide assistance and clarify concepts as needed.

**Conclusion (5 minutes):**

- Summarize the main points of the lesson, including the definitions, properties of metals and alloys, and their practical applications.

- Conduct a quick interactive quiz (using whiteboards or a digital tool) where students can answer true/false or multiple-choice questions related to the lesson content.

- Preview the next session, which will delve into specific applications of alloys in technology and everyday life, encouraging learners to think about where they encounter metals and alloys.

**Extended Activities:**

- Research Project: Assign students to research different metals and their alloys, focusing on their use in an industry of their choice. Students will present their findings in a short presentation.

- Create a Model: Have students create simple models or drawings of items made from various metals and alloys, highlighting their properties and uses.

- Metal vs. Alloy Experiment: If resources allow, set up a simple experiment where students can test the conductivity of various metal strips to observe differences virtually.

**Teacher Self-Evaluation:**

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**WEEK 5: LESSON 1**

**Strand:** Mixtures, Elements, and Compounds

**Sub Strand:** Water Hardness

**Specific Learning Outcomes:**

**- By the end of the lesson, learners should be able to:**

1. Identify the physical properties of water.

2. Describe the physical properties of water.

3. Search the internet for information on physical properties of water.

4. Acknowledge the significance of the physical properties of water.

**Key Inquiry Question:**

- What are the physical properties of water?

**Learning Resources:**

- Lesson notes

- Learner's Textbook

- Water samples from different sources (tanks, boreholes, dams)

- Digital devices for research

**Organisation of Learning:**

**Introduction (5 minutes):**

- Review the previous lesson about mixtures and compounds.

- Initiate a discussion about what students remember about water, leading into its properties.

**Lesson Development (30 minutes):**

**Step 1:** Brainstorming

- In pairs, learners brainstorm the physical properties of water (e.g., color, odor, taste, boiling point).

- Each pair writes down their ideas on a shared graphic organizer to visualize their thoughts.

**Step 2:** Research

- Using digital devices, students search for reliable information about the physical properties of water.

- Encourage students to look at educational websites, videos, or articles, focusing on verified scientific sources.

**Step 3:** Observation

- Learners collect water samples from different sources (if available) or use images of different water sources.

- They make observations based on appearance, odor, and taste. Encourage them to discuss any notable differences observed, even in hypothetical samples.

**Step 4:** Presentation

- Groups present their findings, including their definitions and examples of the physical properties of water, and share any interesting facts they discovered during their research.

- Allow time for questions and discussions after each group presentation to deepen understanding.

**Conclusion (5 minutes):**

- Summarize the key points of the lesson, focusing on the importance and the various physical properties of water.

- Conduct a quick interactive activity, such as a "true or false" quiz based on what they've learned.

- Preview upcoming topics such as water hardness and its implications, prompting learners to think about water quality and its sources.

**Extended Activities:**

- Water Property Experiment: Have learners conduct a simple experiment at home to test the boiling point of water compared to other liquids, documenting their findings with explanations based on what they learned about water.

- Field Trip or Virtual Tour: Organize a trip to a local water treatment plant or a virtual tour exploring ecosystems that depend on water quality.

- Creative Projects: Students can create posters or digital presentations showcasing their findings on water properties and their importance in daily life.

**Teacher Self-Evaluation:**

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**WEEK 5: LESSON 2**

**Strand:** Mixtures, Elements, and Compounds

**Sub Strand:** Water Hardness

**Specific Learning Outcomes:**

**- By the end of the lesson, learners should be able to:**

1. State the meaning of hard water.

2. Discuss the properties of hard water.

3. Search the internet for information on the properties of hard water.

4. Acknowledge the properties of hard water.

**Key Inquiry Question(s):**

- What is hard water?

- What are the properties of hard water?

**Learning Resources:**

- Lesson notes

- Learner's Textbook

- Digital devices (tablets, computers)

- Internet

**Organisation of Learning:**

**Introduction (5 minutes):**

- Review the previous lesson on mixtures, elements, and compounds.

- Ask students to share any prior knowledge about water hardness, guiding a discussion about its connection to the previous topic.

- Introduce the concept of hard water and its importance in everyday life.

**Lesson Development (30 minutes):**

**Step 1:** Define Hard Water

- In pairs, students brainstorm and write down their ideas about the meaning of hard water.

- Invite a few pairs to share their definitions with the class.

- Summarize the discussion, emphasizing that hard water contains high concentrations of minerals, primarily calcium and magnesium.

**Step 2:** Explore Properties of Hard Water

- Students will use digital devices and textbooks to search for specific properties of hard water (e.g., causes scale buildup, affects soap lathering).

- Each group prepares a list of at least four properties based on their research.

**Step 3:** Group Discussion

- Groups come together to discuss their findings. Each group compares the properties and creates a collective list to share with the class.

- Highlight unique findings from each group and encourage questions about the properties presented.

**Step 4:** Present and Acknowledge

- Each group presents their findings to the class, explaining the properties they discovered.

- After presentations, facilitate a brief class discussion to reinforce understanding and correct any misconceptions.

**Conclusion (5 minutes):**

- Summarize key points: Definition of hard water, its properties, and implications for everyday use.

- Conduct a brief interactive activity, such as a quiz using Kahoot! or another fun tool, to reinforce the lesson.

- Preview the next lesson on water filtration methods, posing questions like, "How can we soften hard water?" for consideration.

**Extended Activities:**

- Water Hardness Experiment: Students can collect water samples from different sources (tap water, bottled water, well water) and test for hardness using simple methods (e.g., soap lathering test).

- Research Project: Assign a project where learners investigate the effects of hard water on household items or appliances, presenting their findings to the class.

- Water Conservation Campaign: Groups create informational posters or presentations to educate peers about hard water and its effects, promoting solutions for water management.

**Teacher Self-Evaluation:**

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**WEEK 5: LESSON 3**

**Strand:** Mixtures, Elements and Compounds

**Sub Strand:** Water Hardness

**Specific Learning Outcomes:**

**- By the end of the lesson, the learner should be able to:**

1. State the meaning of soft water.

2. Discuss the properties of soft water.

3. Search the internet for information on properties of soft water.

4. Acknowledge the properties of soft water.

**Key Inquiry Question:**

- What are the properties of soft water?

**Learning Resources:**

- Lesson notes

- Learner's Textbook

- Digital devices (tablets or laptops)

- Flashcards

**Organisation of Learning:**

**Introduction (5 minutes):**

- Review the previous lesson focusing on mixtures and compounds.

- Guide learners to read and discuss relevant content from the learning resources, emphasizing understanding of soft water and its importance.

**Lesson Development (30 minutes):**

**Step 1:** Define Soft Water

- In pairs, learners brainstorm what they think "soft water" means.

- Each pair shares their definitions with the class and the teacher records them on the board, highlighting the key components of their responses.

**Step 2:** Research Properties

- Learners use digital or print resources to find out more about the properties of soft water.

- Encourage learners to look for at least three specific properties and provide examples (e.g., low mineral content, low hardness, etc.).

**Step 3:** Group Discussion

- In small groups, learners discuss their findings from the research step.

- Each group prepares a short presentation summarizing the properties they discovered.

**Step 4:** Class Presentation

- Groups present their findings. Allow questions and clarifications after each presentation.

- Use flashcards to illustrate key properties mentioned in the presentations.

**Conclusion (5 minutes):**

- Summarize the key points and reiterate the learning objectives achieved during the lesson.

- Conduct a brief interactive activity, such as a quiz or a "Think-Pair-Share" session, to reinforce the main concepts discussed.

- Prepare learners for the next session by posing questions related to the hardness of water and its effects on the environment.

**Extended Activities:**

- Have students collect water samples from different sources (tap, rainwater, bottled water) and test them for hardness using simple testing kits.

- Create a poster or digital presentation that compares soft water and hard water, outlining their properties, uses, and effects on daily life.

- Research and write a short report on how water hardness affects household appliances and the impact on the environment.

**Teacher Self-Evaluation:**

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**WEEK 5: LESSON 4**

**Strand:** Mixtures, Elements, and Compounds

**Sub Strand:** Water Hardness

**Specific Learning Outcomes:**

**- By the end of the lesson, the learner should be able to:**

1. Conduct the soap lather test to distinguish between hard and soft water.

2. Group samples of water into hard and soft categories.

3. Enjoy carrying out the activity.

**Key Inquiry Question(s):**

- Which test can you conduct to determine hard and soft water?

**Learning Resources:**

- Lesson notes

- Learner's textbook

- Samples of water (hard and soft)

- Soap detergent

- Containers

- Digital devices

**Organisation of Learning:**

**Introduction (5 minutes):**

- Review the previous lesson on mixtures, emphasizing elements and compounds.

- Guide learners to read and discuss relevant content from the learning resources. Highlight the importance of water hardness in everyday life.

**Lesson Development (30 minutes):**

**Step 1:** Introduction to the Soap Lather Test

- Explain the soap lather test and its significance in determining water hardness. Discuss what hard water is (contains high mineral content) and what soft water is (low mineral content).

**Step 2:** Group Activity Preparation

- Divide learners into small groups and distribute the materials (water samples, soap detergent, and containers).

- Guide groups to formulate a step-by-step plan to conduct their tests. Encourage them to think about how they will ensure a fair test.

**Step 3:** Conduct the Soap Lather Test

- Allow groups to conduct the soap lather test with their samples. Instruct them to observe how the water reacts with soap (the amount and quality of lather produced).

- Remind them to take notes on the differences they observe.

**Step 4:** Data Analysis and Presentation

- Ask each group to categorize their samples into hard and soft water based on their observations.

- Have groups present their findings to the class, highlighting the differences in lathering capabilities.

**Conclusion (5 minutes):**

- Summarize the key points of the lesson: the definition of hard and soft water, the soap lather test, and their observations.

- Conduct a brief interactive activity such as a quiz or a class discussion to reinforce the concepts learned.

- Preview the next session, suggesting that learners think about how water hardness can affect daily life (e.g., soap usage, appliances, etc.).

**Extended Activities:**

- Research Project: Have students research the effects of hard water on various appliances and household items. They could present their findings through a poster or a digital presentation.

- Water Quality Survey: Encourage students to test water samples from different sources at home (tap water, bottled water, rainwater) and analyze their findings in class.

- Soap Experimentation: Let students experiment with different types of soap to see how well they work with hard vs. soft water.

**Teacher Self-Evaluation:**

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**WEEK 5: LESSON 5**

**Strand:** Mixtures, Elements, and Compounds

**Sub Strand:** Water Hardness

**Specific Learning Outcomes:**

**- By the end of the lesson, learners should be able to:**

1. Identify methods of softening hard water in daily life.

2. Describe boiling as a method of softening temporary hard water.

3. Conduct an activity to soften hard water using the boiling method.

4. Appreciate boiling as one of the methods of softening temporary hard water.

**Key Inquiry Question:**

- How can we soften temporary hard water in the environment?

**Learning Resources:**

- Lesson notes

- Learner's textbook

- Sample of hard water

- Source of heat: Bunsen burner

- Beakers

- Filter papers

- Funnels

**Organisation of Learning:**

**Introduction (5 minutes):**

- Quickly review the previous lesson, ensuring students remember key terms related to mixtures and compounds.

- Guide learners to read and discuss relevant content from the textbook regarding water hardness, emphasizing concepts associated with temporary hard water.

**Lesson Development (30 minutes):**

**Step 1:** Identify Methods of Softening Hard Water

- In groups, learners brainstorm different methods of softening hard water they encounter in daily life (e.g., commercially available softeners, boiling, adding chemicals).

- Each group shares their findings with the class to create a list on the board.

**Step 2:** Research Boiling as a Method

- Learners use print or digital resources to explore how boiling specifically softens temporary hard water. They should focus on the chemical process involved (precipitation of calcium and magnesium salts).

- Groups prepare short presentations to explain their findings to the class.

**Step 3:** Conduct the Boiling Experiment

- Each group conducts an experiment where they boil a sample of hard water in a beaker over a Bunsen burner. They must observe and record any changes they notice.

**Step 4:** Discussion and Observation Recording

- After boiling, students filter the boiled hard water and compare it to the original sample. They discuss their observations and reflect on the effectiveness of the boiling method in softening the water.

**Conclusion (5 minutes):**

- Summarize key points discussed in the lesson, reinforcing the learning objectives achieved.

- Engage students with an interactive quiz or discussion to reinforce main topics, including why the boiling method works.

- Prepare learners for the next session by previewing upcoming topics related to solutions and classification of matter.

**Extended Activities:**

- Research Assignment: Learners can investigate further methods of softening hard water used in different cultures and report back.

- Creative Project: Have students design an informative poster or brochure that highlights methods of softening hard water and its implications for environmental health.

- Field Study: Organize a visit to a local water treatment plant to observe real-life applications of water softening techniques.

**Teacher Self-Evaluation:**

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**WEEK 6: LESSON 1**

**Strand:** Mixtures, Elements, and Compounds

**Sub Strand:** Water Hardness

**Specific Learning Outcomes**

**- By the end of the lesson, students should be able to:**

1. Describe the addition of washing soda as a method of softening temporary hard water.

2. Carry out an activity to soften temporary hard water using washing soda.

3. Acknowledge washing soda's use in softening temporary hard water.

**Key Inquiry Question:**

- How does the addition of washing soda soften temporary hard water?

**Learning Resources:**

- Lesson notes

- Digital devices

- Learner's textbook

- Sample of temporary hard water

- Sodium Carbonate (washing soda)

- Beaker

- Stirring rods

- Filter paper

- Funnel

**Organisation of Learning:**

**Introduction (5 minutes):**

- Begin the lesson by reviewing the previous topics related to mixtures and compounds.

- Prompt students to read and discuss relevant sections from their textbooks about water hardness, focusing on temporary hard water and methods of softening it.

**Lesson Development (30 minutes):**

**Step 1:** Research

- In small groups, students will use digital or print resources to research how washing soda acts to soften temporary hard water. They should focus on the science behind this process, looking for relevant reactions and explanations.

**Step 2:** Discussion

- Groups will then discuss their findings, sharing critical points and clarifying any misconceptions. Encourage each group to identify at least two key reasons why washing soda is effective for softening hard water.

**Step 3:** Hands-On Activity

- Guide each group to carry out a practical activity where they will add washing soda to a measured sample of temporary hard water in a beaker. Each group should stir the mixture and observe any changes that occur at the same time.

**Step 4:** Observation and Discussion

- Students will record their observations, discussing as a group what happened to the water when washing soda was added. Ask leading questions on what chemical changes may have happened during the experiment.

**Conclusion (5 minutes):**

- Summarize the key points learned in the lesson, reinforcing how washing soda softens temporary hard water.

- Conduct a brief interactive quiz (e.g., Kahoot or a verbal quiz) to reinforce their understanding of main topics.

- Preview the next lesson on permanent hard water and other water treatment methods, encouraging students to think about additional substances that might help in water softening.

**Extended Activities:**

- Research Assignment: Students could research other methods of softening water and compare their effectiveness to washing soda, presenting their findings in a short report.

- Class Debate: Organize a debate on the environmental impact of using detergents and softeners in our water systems versus their benefits.

- Experiment Journal: Students can keep a journal of various experiments they conduct at home related to water hardness and share their notes in class.

**Teacher Self-Evaluation:**

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**WEEK 6: LESSON 2**

**Strand:** Mixtures, Elements, and Compounds

**Sub Strand:** Water Hardness

**Specific Learning Outcomes:**

**- By the end of the lesson, learners should be able to:**

1. Describe distilling as a method of softening temporary hard water.

2.Conduct an activity to soften temporary hard water using the distilling method.

3.Appreciate distilling as a method of softening temporary hard water.

**Key Inquiry Question:**

- How can we soften temporary hard water using the distilling method?

**Learning Resources:**

- Lesson notes

- Learner's textbook

- Distillation apparatus (condenser, heat source, etc.)

- Sample of temporary hard water

**Organisation of Learning:**

**Introduction (5 minutes):**

- Start with a brief review of the previous lesson on types of water hardness.

- Ask students to share their understanding of temporary hard water and introduce the concept of distillation as a solution.

- Encourage a brief discussion on why it’s important to soften hard water.

**Lesson Development (30 minutes):**

**Step 1:** Brainstorming the Meaning of Distilling

- In groups, students brainstorm and write down their initial thoughts on what distilling means.

- Each group shares one idea with the class to build a collective understanding.

**Step 2:** Research and Discussion

- Students use digital or print resources to find information about distilling, focusing on its application in softening temporary hard water.

- Groups will discuss their findings and compile a list of key points about distilling.

**Step 3:** Conducting the Distillation Activity

- Demonstrate how to set up the distillation apparatus.

- Groups prepare their samples of temporary hard water and begin the distillation process focusing on safety and proper technique.

**Step 4:** Observations and Results Discussion

- Students observe the distillation process and record their findings regarding the softening of water.

- Facilitate a discussion on what they observed, asking them to connect their results to the theory of distillation.

**Conclusion (5 minutes):**

- Summarize the key points about how distillation works and its effectiveness in softening temporary hard water.

- Engage the class in a quick quiz or a hands-on activity, such as matching terms (distillation, evaporation, condensation) with their definitions.

- Preview the next lesson, which will explore permanent hard water and treatment methods.

**Extended Activities:**

- Create a poster or digital presentation explaining the distillation process, illustrating its significance in real-world applications like water treatment.

- Conduct research on different methods used to soften water and compare their effectiveness and applications.

- Investigate local water supplies and how water hardness affects households and industries in the community.

**Teacher Self-Evaluation:**

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**WEEK 6: LESSON 3**

**Strand:** Mixtures, Elements, and Compounds

**Sub-Strand:** Water Hardness

**Specific Learning Outcomes:**

**- By the end of the lesson, learners should be able to:**

1.Outline the advantages and disadvantages of hard water.

2. Discuss the advantages and disadvantages of hard water.

3. Search the internet for information on advantages and disadvantages of hard water.

4.Acknowledge the advantages and disadvantages of hard water.

**Key Inquiry Questions:**

- Why is hard water preferred for drinking?

- What are the advantages of hard water?

- What are the disadvantages of hard water?

**Learning Resources:**

- Lesson notes

- Learner's textbook

- Digital devices (computers/tablets)

- Charts or flashcards

**Organisation of Learning:**

**Introduction (5 minutes):**

- Begin with a brief review of the previous lesson to connect the knowledge.

- Ask students what they remember about water and its properties.

- Guide learners to read and discuss relevant content about hard water from the learning resources, emphasizing the understanding of key concepts related to water hardness.

**Lesson Development (30 minutes):**

**Step 1:** Brainstorming

- Divide the class into small groups or pairs.

- Ask each group to brainstorm and list the advantages and disadvantages of hard water. Encourage them to think critically about its impact on health and household use.

**Step 2:** Research

- Instruct learners to use digital and print resources to search for additional information regarding hard water.

- Provide specific search terms related to the topic. Ask learners to focus on credible sources and data.

**Step 3:** Discussion

- Bring the class back together and facilitate a discussion.

- Each group will share their findings, highlighting both advantages and disadvantages.

**Step 4:** Presentation

- Allow each group to present their compiled information on hard water to the class.

- Encourage questions and clarifications from peers after each presentation.

**Conclusion (5 minutes):**

- Summarize the key points discussed during the lesson, ensuring that the advantages and disadvantages of hard water are clearly highlighted.

- Conduct a brief interactive activity, such as a quick quiz or a think-pair-share, to reinforce the main topics learned.

- Prepare learners for the next session by giving them a preview of upcoming topics or framing questions to consider after today's lesson.

**Extended Activities:**

- Write a short essay on personal experiences with hard water, discussing how it has impacted daily life.

- Create a flyer or infographic summarizing the advantages and disadvantages of hard water to be shared at school or in the community.

- Conduct an experiment to compare the effects of hard and soft water on plants, observing differences in growth over a few weeks.

**Teacher Self-Evaluation:**

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**WEEK 6: LESSON 4**

**Strand:** Mixtures, Elements, and Compounds

**Sub Strand:** Water Hardness

**Specific Learning Outcomes:**

**- By the end of the lesson, learners should be able to:**

1. Outline the advantages and disadvantages of soft water in our daily life.

2. Discuss the advantages and disadvantages of soft water.

3. Search the internet for additional information on the advantages and disadvantages of soft water.

4. Acknowledge the advantages and disadvantages of soft water in the environment.

**Key Inquiry Questions:**

- What are the advantages of soft water?

- What are the disadvantages of soft water?

**Learning Resources:**

- Lesson notes

- Learner's Textbook

- Digital devices (tablets or computers)

- Charts or flashcards

**Organisation of Learning:**

**Introduction (5 minutes):**

- Start by reviewing the previous lesson focusing on mixtures and compounds.

- Provide a brief overview of water hardness and its significance in our daily lives.

- Guide learners to read relevant sections from the textbook or lesson notes.

- Encourage a quick discussion among partners about their prior knowledge of soft and hard water.

**Lesson Development (30 minutes):**

**Step 1:** Brainstorming Session

- Students are divided into small groups or pairs.

- Each group will brainstorm a list of advantages and disadvantages of soft water, based on their existing knowledge.

- Encourage them to write down at least three points in each category.

**Step 2:** Research

- Using digital devices, learners will search for more information about soft water.

- They will utilize kid-friendly search engines to find at least two advantages and two disadvantages of soft water, noting sources for reference.

**Step 3:** Group Discussion

- Once the research is complete, groups will come together to share their findings.

- Encourage discussions about the points they gathered, promoting critical thinking by asking follow-up questions like "Why is this an advantage?" or "What impacts does this disadvantage have on our environment?"

**Step 4:** Presentations

- Each group will present their findings to the class.

- During the presentations, other students can ask questions for clarification, enhancing understanding and engagement.

**Conclusion (5 minutes):**

- Summarize the key points discussed regarding the advantages and disadvantages of soft water.

- Conduct a brief interactive activity where students can either vote on a soft water statement using thumbs up or down.

- Finish by previewing the next session’s topic - "The Impact of Water Quality on Ecosystems."

**Extended Activities:**

- Project: Have students create a poster or digital presentation highlighting their favorite uses of soft water in daily life and its environmental impact.

- Experiment: Conduct a simple experiment to compare the effects of hard and soft water on soap’s effectiveness. This could be done with a quick demonstration or at home with parental guidance.

- Debate: Organize a debate on the topic "Soft Water vs. Hard Water: Which is Better for Our Environment?" to encourage critical thinking and public speaking skills.

**Teacher Self-Evaluation:**

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**WEEK 6: LESSON 5**

**Strand:** Mixtures, Elements, and Compounds

**Sub Strand:** Water Hardness

**Specific Learning Outcomes:**

**- By the end of the lesson, learners should be able to:**

1.State the applications of soft water in daily life.

2.Discuss the applications of soft water in daily life.

3.Search the internet for various applications of soft water.

4.Appreciate the importance of soft water in everyday activities.

**Key Inquiry Question(s):**

- What are the applications of soft water in our daily life?

**Learning Resources:**

- Lesson notes

- Charts

- Digital devices

- Learner's Textbook

**Organisation of Learning:**

**Introduction (5 minutes):**

- Review: Begin with a quick review of the previous lesson on the properties of mixtures, elements, and compounds.

- Discussion: Prompt learners to read the relevant section in their textbooks and discuss key concepts regarding soft water and its significance.

**Lesson Development (30 minutes):**

**Step 1:** Brainstorm Applications

- In pairs, have learners brainstorm a list of possible applications of soft water.

- Encourage them to consider examples from their own experiences.

**Step 2:** Explore Digital Resources

- Guide learners to use digital devices (like tablets or laptops) to research the broader applications of soft water.

- They should aim to find at least three specific examples, noting their sources.

**Step 3:** Group Discussion

- After research, gather the class for a group discussion.

- Each pair presents their findings, promoting dialogue about commonalities and differences in applications.

**Step 4:** Create Charts

- Ask learners to prepare charts outlining the applications of soft water, using visuals to enhance understanding.

- Each pair should summarize their presentations on the chart while ensuring they include creative elements for clarity.

**Conclusion (5 minutes):**

- Summarize: Highlight the main points covered in the lesson such as the importance of soft water in activities like cleaning, cooking, and personal care.

- Interactive Activity: Conduct a quick quiz or interactive game to reinforce the main topics. For instance, use a “soft water bingo” where certain applications are called out and learners mark them on their bingo cards.

- Preview Next Lesson: Briefly introduce the upcoming topics related to water hardness and its implications in various fields.

**Extended Activities:**

- Research Project: Assign learners a project to investigate water hardness in their local area and its impact on daily activities. They can include interviews with local businesses that rely on water quality.

- Presentation Preparation: Learners can prepare a short presentation on the effects of hard water compared to soft water in daily life, including visuals, to share in a future class.

- Home Experiment: Encourage learners to observe the effects of both hard and soft water in their homes (e.g., using soap or detergent) and bring their findings to the next class for discussion.

**Teacher Self-Evaluation:**

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**WEEK 7: LESSON 1**

**Strand:** Mixtures, Elements and Compounds

**Sub Strand:** Water Hardness

**Specific Learning Outcomes:**

**- By the end of the lesson, the learner should be able to:**

1.State the applications of hard water in our daily life.

2. Discuss the applications of hard water in our daily life.

3. Search the internet for applications of hard water in our daily life.

4.Appreciate the applications of hard water in our day-to-day life.

**Key Inquiry Question(s):**

- What are the applications of hard water in our daily life?

**Learning Resources:**

- Lesson notes

- Learner's textbook

- Digital devices (Internet)

- Charts or flashcards

**Organisation of Learning:**

**Introduction (5 minutes):**

- Review: Begin with a quick recap of the previous lesson about mixtures, elements, and compounds. Ask students about what they remember regarding water and its properties.

- Discussion: Briefly introduce the concept of water hardness. Engage learners in a discussion by asking them if they know what hard water is and where it might be found in their homes.

**Lesson Development (30 minutes):**

**Step 1:** Brainstorming Applications

- In small groups, students brainstorm various applications of hard water. Each group writes down their ideas on a piece of paper, considering areas such as household activities, gardening, washing clothes, etc.

**Step 2:** Researching Applications

- Students will use digital devices or textbooks to gather more information about hard water. They should focus on identifying both beneficial and negative applications of hard water. Encourage them to take notes on their findings.

**Step 3:** Group Discussion

- Groups discuss the findings from their research, ensuring that they acknowledge different viewpoints (advantages and disadvantages of hard water). Each group prepares to present their top three applications to the class.

**Step 4:** Chart Preparation and Presentation

- Each group creates a chart that represents the applications of hard water they found. They will present their charts to the class, explaining each application briefly.

**Conclusion (5 minutes):**

- Class Summary: Summarize the main points discussed about the applications of hard water. Check understanding by asking a few students to share one thing they learned.

- Interactive Activity: Conduct a quick quiz (either verbal or written) related to hard water applications to reinforce the topics discussed.

- Preview: Introduce the next topic to be covered in the upcoming lesson, asking students to think about how water quality may affect health, to stimulate curiosity.

**Extended Activities:**

- Home Experiment: Encourage students to collect both hard and soft water samples (if possible) from home and examine the differences in soap lathering, or observe effects in a planting experiment with both types of water.

- Research Project: Assign a research project where students can explore the impact of hard water on health and household technologies, presenting their findings in a follow-up class.

**Teacher Self-Evaluation:**

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**WEEK 7: LESSON 2**

**Strand:** Mixtures, Elements, and Compounds

**Sub Strand:** Water Hardness

**Assessment:** Learner’s understanding of water hardness through assessment questions.

**Specific Learning Outcomes:**

**- By the end of the lesson, learners should be able to:**

1. Attempt assessment questions on the sub-strand of water hardness.

**Key Inquiry Question(s):**

- What is water hardness, and why is it important to understand in biology and environmental science?

- How can we determine if water is hard or soft, and what implications might that have on living organisms?

**Learning Resources:**

- Assessment books

- Learner's Textbook

- Teacher's Assessment Questions

**Organisation of Learning:**

**Introduction (5 minutes):**

- Begin by reviewing the previous lesson about mixtures, elements, and compounds.

- Ask students if they remember what makes up different types of water, linking it to the upcoming discussion on water hardness.

- Guide students to read the relevant sections in their textbooks, focusing on key concepts like calcium and magnesium in water.

**Lesson Development (30 minutes):**

**Step 1:** Understanding Water Hardness

- Explain the concept of water hardness, including the definitions of "hard" and "soft" water. Use diagrams or charts to show the minerals that contribute to hardness.

- Discuss the differences between temporary and permanent hardness and their sources.

**Step 2:** Real-Life Applications

- Present examples of how water hardness affects daily life, such as its impact on cleaning, plumbing, and the environment.

- Encourage students to think about how hard water might affect local ecosystems or their own homes.

**Step 3:** Group Activity

- Divide learners into pairs or small groups. Provide them with assessment questions from the teacher's questions.

- Allow them time to discuss and answer the questions, reinforcing their understanding of water hardness.

**Step 4:** Class Discussion

- Regroup as a class and ask each pair/group to share one or two of their answers.

- Clarify any misconceptions and reinforce correct information.

**Conclusion (5 minutes):**

- Summarize the key points discussed: what water hardness is, its implications, and how to identify it.

- Conduct a brief interactive activity: Ask students to categorize various examples of water (tap, distilled, hard, soft) and discuss their characteristics.

- Prepare learners for the next session by previewing upcoming topics, such as water purification methods and their relevance to water hardness.

**Extended Activities:**

- Water Sampling Investigation: Have students collect water samples from different sources (home, local river, etc.) and test for hardness using simple kits or indicators.

- Research Project: Assign students to research different methods of softening hard water and present their findings to the class.

- Creative Presentation: Ask students to create a poster or infographic illustrating the effects of hard water on health, appliances, and the environment, sharing their work in a gallery walk format.

**Teacher Self-Evaluation:**

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**WEEK 7: LESSON 3**

**Strand:** Living Things and Their Environment

**Sub Strand:** Nutrition in Plants

**Specific Learning Outcomes:**

**- By the end of the lesson, learners should be able to:**

1 Identify the external parts of a leaf.

2.Describe the external parts of a leaf.

3. Draw and label the external parts of a leaf.

4.Enjoy drawing and labeling the external parts of a flower.

**Key Inquiry Question:**

- What are the external features of a leaf?

**Learning Resources:**

- Lesson notes

- Learner's Textbook

- Pictures of leaves and flowers

- Digital devices (tablets/laptops)

- Hand lenses

- Fresh leaves (various types)

**Organisation of Learning:**

**Introduction (5 minutes):**

- Briefly review the previous lesson on photosynthesis and its significance in plant nutrition.

- Engage learners in a discussion by asking what they remember about plant structures.

- Guide learners to read and discuss relevant sections from their textbooks regarding leaf structure, highlighting the importance of external features.

**Lesson Development (30 minutes):**

**Step 1:** Observation of Leaves

- Divide the class into pairs or small groups. Each group receives a fresh leaf and a hand lens.

- Instruct learners to observe the leaf closely using the hand lenses and note down what they see, focusing on shape, margin, veins, and any other distinct features.

**Step 2:** Identification and Discussion

- Have learners gather and share their observations within their groups.

- Prompt them to identify and discuss the external parts of the leaf, including the petiole, blade, margin, and veins.

- Facilitate a class discussion to ensure all groups are familiar with the key external features.

**Step 3:** Drawing and Labeling

- Instruct each group to draw their observed leaf on a chart or paper.

- Make sure they label each part of the leaf clearly.

- Encourage creativity and neatness in their drawings.

**Step 4:** Flower Activity

- Present pictures of various flowers and demonstrate how to identify their external parts.

- Allow time for learners to sketch and label a flower’s external features in their notebooks, encouraging them to refer to the illustrations for accuracy.

**Conclusion (5 minutes):**

- Summarize the key points discussed during the lesson, including the external parts of leaves and flowers.

- Conduct a brief interactive activity (e.g., a “leaf bingo” game, where learners match features to their respective labels).

- Prepare learners for the next session by highlighting that they will explore how leaves function in photosynthesis and other plant processes.

**Extended Activities:**

- Create a Leaf Collection: Encourage students to collect different types of leaves and create a scrapbook with their observations, drawings, and labels.

- Leaf Art Project: Have students create leaf rubbings or collages using real leaves, emphasizing the textures and patterns found in nature.

- Research Assignment: Assign students to research a specific type of plant (e.g., flowering, non-flowering) and its leaf adaptations, and prepare a short presentation for the class.

**Teacher Self-Evaluation:**

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**WEEK 7: LESSON 4**

**Strand:** Living Things and Their Environment

**Sub Strand:** Nutrition in Plants

**Specific Learning Outcomes:**

**- By the end of the lesson, learners should be able to:**

1. Identify the internal parts of a leaf.

2. Describe the internal features of a leaf.

3. Draw and label the internal features of a leaf.

4. Enjoy drawing the internal parts of a leaf.

**Key Inquiry Question:**

- Which internal parts of a leaf do you know?

**Learning Resources:**

- Lesson notes

- Pictures and diagrams

- Learner's textbook

- Charts

**Organisation of Learning:**

**Introduction (5 minutes):**

- Review the previous lesson related to plant structures.

- Initiate a discussion on what students know about leaves and their functions. Use questions to gauge prior knowledge and activate interest.

**Lesson Development (30 minutes):**

**Step 1:** Observation

- In pairs, learners will use their digital devices or given diagrams to observe and identify the internal parts of a leaf (e.g., epidermis, mesophyll, stomata).

**Step 2:** Discussion

- Guide groups to discuss the functions of the identified parts, such as how the stomata help in gas exchange and how chloroplasts contribute to photosynthesis.

**Step 3:** Drawing

- Students will independently draw the internal structure of a leaf in their notebooks, ensuring to include key components they have discussed.

**Step 4:** Labeling

- Each learner will label their drawing and create a colorful chart that outlines both the internal parts and their functions.

**Conclusion (5 minutes):**

- Summarize the key points of internal leaf anatomy and the importance of each part in the context of plant nutrition.

- Conduct an interactive Q&A session to reinforce learning and clarify any confusion.

- Preview what will be learned in the next session about the process of photosynthesis and consider how it relates to leaf anatomy.

**Extended Activities:**

- Leaf Investigation: Encourage students to collect different types of leaves and examine them under a microscope to see their internal structures more clearly.

- Creative Project: Have students create a poster or digital presentation outlining how different leaf structures enhance the plant’s ability to perform photosynthesis in various environments.

- Field Trip: Organize a trip to a local botanical garden to study various plants and their leaves, discussing how adaptations in leaf structure contribute to their survival in specific environments.

**Teacher Self-Evaluation:**

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**WEEK 7: LESSON 5**

**Strand:** Living Things and Their Environment

**Sub-Strand:** Nutrition in Plants

**Specific Learning Outcomes:**

**- By the end of the lesson, learners should be able to:**

1. State the adaptations of a leaf to photosynthesis.

2. Discuss the adaptations of the leaf to photosynthesis.

3. Prepare charts showing the adaptations of the leaf to photosynthesis.

4. Acknowledge the adaptations of the leaf to photosynthesis.

**Key Inquiry Question:**

How is the leaf adapted to ensure photosynthesis?

**Learning Resources:**

- Lesson notes

- Digital devices

- Charts

- Learner's Textbook

**Organisation of Learning:**

**Introduction (5 minutes):**

- Review the previous lesson on plant structure and functions related to nutrition.

- Guide learners to read and discuss relevant content from the lesson notes and textbook, highlighting key concepts about leaves and their roles in photosynthesis.

**Lesson Development (30 minutes):**

**Step 1:** Group Formation

- Divide the class into small groups (4-5 students each).

- Assign each group a specific focus area regarding the adaptations of leaves (e.g., surface area, chlorophyll concentration, stomata presence).

**Step 2:** Research and Note-taking

- Instruct groups to use digital devices or textbooks to find information about their assigned adaptation.

- Encourage them to take notes on how each adaptation helps the leaf's function in photosynthesis.

**Step 3:** Discussion

- Each group will discuss their findings and relate the adaptations to the process of photosynthesis.

- Encourage critical thinking by asking groups to consider “How does this adaptation improve the efficiency of photosynthesis?”

**Step 4:** Chart Creation and Presentation

- Have each group create a chart illustrating their adaptation(s) and their roles in photosynthesis.

- Conclude the session by allowing each group to present their chart to the class, explaining their findings and insights.

**Conclusion (5 minutes):**

- Summarize the key points learned about the adaptations of leaves to photosynthesis.

- Conduct a brief interactive activity, such as a quiz or a quick review game, to reinforce learning.

- Preview upcoming topics related to plant nutrition and other factors affecting photosynthesis.

**Extended Activities:**

- Create a Leaf Adaptation Poster: Students can individually create a poster that highlights different types of leaves and their specific adaptations for photosynthesis in various environments.

- Field Study: Organize a field trip to a local botanical garden where students can observe different plant leaves and their adaptations in real-life settings.

- Research Project: Assign a project where students research how changes in environmental conditions, such as light and water availability, affect leaf adaptations and overall plant health.

**Teacher Self-Evaluation:**

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**WEEK 9: LESSON 1**

**Strand:** Living Things and Their Environment

**Sub Strand:** Nutrition in Plants

**Specific Learning Outcomes:**

**- By the end of the lesson, learners should be able to:**

1. Identify the parts of the chloroplast.

2. Discuss the structure of the chloroplast and its role in photosynthesis.

3. Draw and label the parts of the chloroplast.

4. Appreciate the role of chloroplasts in photosynthesis.

**Key Inquiry Question(s):**

- How is the chloroplast adapted to its function?

**Learning Resources:**

- Charts of chloroplast structure

- Photomicrographs of chloroplasts

- Lesson notes

- Digital devices for research

- Learner's Textbook

**Organisation of Learning:**

**Introduction (5 minutes):**

- Begin with a brief review of the previous lesson on plant nutrition.

- Introduce the topic of chloroplasts and their significance in photosynthesis. Use digital devices to display images of chloroplasts.

**Lesson Development (30 minutes):**

**Step 1:** Observation

- In pairs or small groups, learners will observe the structure of chloroplasts using charts or photomicrographs.

- Each group will take notes on the visible parts of the chloroplast.

**Step 2:** Identification

- Students will identify and name the key parts of the chloroplast, such as the thylakoid, stroma, and granum, facilitated by guidance from the teacher.

**Step 3:** Discussion

- Facilitate a group discussion where students will explore how each part of the chloroplast is adapted for photosynthesis. Encourage them to think critically about the structure-function relationship.

**Step 4:** Drawing and Labeling

- Students will draw and label the parts of a chloroplast in their exercise books. Encourage creativity and accuracy, then select a few drawings to display on the classroom board.

**Conclusion (5 minutes):**

- Summarize the key points discussed: parts of the chloroplast, its structure, and its role in photosynthesis.

- Conduct a quick interactive quiz or a "think-pair-share" activity to reinforce the day's learning.

- Preview the next class’s topic: “The process of photosynthesis and its importance for life on Earth.”

**Extended Activities:**

- Chloroplast Model Creation: Have students create a 3D model of a chloroplast using art supplies, highlighting the key parts they learned.

- Research Assignment: Ask students to research different types of photosynthesis in various plants and present their findings in the next class.

- Interactive Online Quiz: Use digital platforms to create a quiz covering chloroplast functions and parts for students to complete at home.

**Teacher Self-Evaluation:**

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**WEEK 9: LESSON 2**

**Strand:** Living Things and Their Environment

**Sub Strand:** Nutrition in Plants

**Specific Learning Outcomes:**

**- By the end of the lesson, learners should be able to:**

1. Define the term Photosynthesis in plants.

2. Describe the process of Photosynthesis in plants.

3. Search the internet for information on the process of Photosynthesis.

4. Appreciate the process of Photosynthesis in nature.

**Key Inquiry Questions:**

- What is photosynthesis?

- What are the products of photosynthesis?

**Learning Resources:**

- Lesson notes

- Digital devices (tablets, computers)

- Learner's textbook

- Video clips about photosynthesis

**Organisation of Learning:**

**Introduction (5 minutes):**

- Review the previous lesson on plant cells and their functions.

- Guide learners to read and discuss relevant content in their textbooks, emphasizing understanding of the key concepts surrounding photosynthesis and the importance of light, water, and carbon dioxide.

**Lesson Development (30 minutes):**

**Step 1:** Definition of Photosynthesis

- In pairs, learners will search the meaning of photosynthesis using textbooks and digital devices.

- Each pair will draft a concise definition, which they will share with the class, allowing for clarification and discussion.

**Step 2:** The Process of Photosynthesis

- Learners will work in small groups to explore the steps involved in photosynthesis: light absorption, water splitting, carbon fixation, and glucose production.

- Each group will use digital devices to research the specific steps and create a simple diagram illustrating the process, which they will present to the class.

**Step 3:** Products of Photosynthesis

- Transition into discussing the products (oxygen and glucose) of photosynthesis by asking groups to describe the importance of these products for both plants and other living organisms.

- Groups will present their findings and discuss how these products contribute to the larger ecosystem.

**Step 4:** Video Clip and Class Discussion

- Watch a brief video on photosynthesis to visualize the concepts learned.

- Hold a class discussion afterward to reinforce understanding, addressing any questions students may have about the process.

**Conclusion (5 minutes):**

- Summarize key points about photosynthesis, including the definition, process, and significance in nature.

- Conduct a quick interactive quiz or activity where students match terms with definitions or fill in blanks from what they've learned.

- Preview the next topic, "Plant Respiration," encouraging students to think about how plants use the products of photosynthesis.

**Extended Activities:**

- Create a Photosynthesis Poster: Students can design a poster that includes the definition, process, and importance of photosynthesis, using visuals and diagrams.

- Nature Walk: Organize a nature walk for students to observe plants and discuss how they might be undergoing photosynthesis, looking for evidence (e.g., leaf structure, sunlight exposure).

- Photosynthesis Experiment: Conduct a simple experiment using aquatic plants (like Elodea) in light and dark conditions to observe oxygen production.

**Teacher Self-Evaluation:**

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**WEEK 9: LESSON 3**

**Strand:** Living Things and Their Environment

**Sub Strand:** Nutrition in Plants

**Specific Learning Outcomes:**

**- By the end of the lesson, learners should be able to:**

1. Identify the conditions necessary for photosynthesis to occur in plants.

2. Discuss the conditions necessary for photosynthesis to take place in plants.

3. Search the internet for information on conditions necessary for photosynthesis to occur in plants.

4. Acknowledge the conditions necessary for photosynthesis to occur.

**Key Inquiry Question(s):**

- What are the necessary conditions for photosynthesis to occur?

**Learning Resources:**

- Lesson notes

- Digital devices

- Learner's Textbook

- Charts/Posters

**Organisation of Learning:**

**Introduction (5 minutes):**

- Review the previous lesson on plant structures and their functions.

- Guide learners to read and discuss relevant content from the learning resources, emphasizing the understanding of the key concepts of photosynthesis.

**Lesson Development (30 minutes):**

**Step 1:** Introduction to Photosynthesis

- Begin by asking students what they know about photosynthesis.

- Introduce the main concept: photosynthesis is the process through which plants make their food using sunlight, carbon dioxide, and water.

- Note the conditions (light, carbon dioxide, water, and chlorophyll) on the board.

**Step 2:** Group Research

- Divide the class into small groups or pairs.

- Assign each group to use digital devices or printed resources to research the necessary conditions for photosynthesis, encouraging them to find specific examples and explanations.

- Encourage them to take notes and prepare to share their findings.

**Step 3:** Discussion and Findings

- Groups discuss their findings, ensuring each member contributes.

- Each group prepares a short presentation (2-3 minutes) on what they learned about the conditions necessary for photosynthesis.

**Step 4:** Poster/Chart Preparation

- Each group creates a poster or chart that visually represents their findings on the conditions necessary for photosynthesis.

- They should include images, charts, or diagrams to enhance their presentations.

- Summarize the key points covered in the lesson—light, water, carbon dioxide, and chlorophyll are crucial for photosynthesis.

- Conduct a brief interactive quiz (e.g., Kahoot or verbal questions) to reinforce the main topics covered.

- Preview the next lesson, which will explore the importance of photosynthesis in ecosystems and human life.

**Extended Activities:**

- Create a photo diary documenting various plants and their environments, detailing how these factors affect their growth and photosynthesis.

- Research and write a short report on the impact of deforestation on photosynthesis and the environment.

- Organize a field trip to a local garden or greenhouse to observe plants and their photosynthesis conditions firsthand.

**Teacher Self-Evaluation:**

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**WEEK 9: LESSON 4**

**Strand:** Living Things and Their Environment

**Sub Strand:** Nutrition in Plants

**Specific Learning Outcomes:**

**- By the end of the lesson, learners should be able to:**

1.State the importance of photosynthesis in nature.

2. Discuss why photosynthesis is essential for life on Earth.

3. Search the internet for additional information on the importance of photosynthesis.

4.Acknowledge and explain the significance of photosynthesis in natural ecosystems.

**Key Inquiry Question:**

- What is the importance of photosynthesis in nature?

**Learning Resources:**

- Lesson notes

- Digital devices (computers/tablets)

- Learner's textbooks

**Organisation of Learning:**

**Introduction (5 minutes):**

- Review Previous Lesson: Start with a quick recap of the previous lesson on plant structure and function. Ask students to recall the role of chlorophyll in plants.

- Discussion of Key Concepts: Guide learners to skim through the textbooks and lesson notes to identify key concepts related to photosynthesis, specifically its process and significance.

**Lesson Development (30 minutes):**

**Step 1:** Brainstorming

- Group Formation: Divide students into small groups or pairs.

- Prompt Ideas: Ask each group to brainstorm and list as many reasons why photosynthesis might be important in nature. Encourage them to think about food production, oxygen release, and carbon dioxide uptake.

**Step 2:** Research

- Internet Activity: In their groups, students will use digital devices to search for reliable sources of information on the importance of photosynthesis. They should note key information and interesting facts that support their brainstormed ideas.

**Step 3:** Class Discussion

- Group Presentations: Each group presents their findings to the class. Encourage other students to ask questions or add to the points made by their peers, fostering an interactive discussion.

**Step 4:** Summary Chart Creation

- Visual Learning: On the board, create a summary chart based on the presentations. List different points made by the groups and categorize them into sections (e.g., ecological importance, impact on human life, role in the global carbon cycle).

**Conclusion (5 minutes):**

- Summarization: Recap the key points discussed, emphasizing the diverse benefits of photosynthesis.

- Interactive Activity: Conduct a quick quiz or a fun game like "Hand Up, Stand Up, Pair Up" where students pair with someone different and share one fact they learned about photosynthesis.

- Preview Next Lesson: Briefly introduce the next topic, which will cover how different factors (light, temperature, carbon dioxide) affect the rate of photosynthesis. Pose the question: "What do you think happens to photosynthesis in extreme conditions?"

**Extended Activities:**

- Creative Project: Have students create a poster or digital presentation that illustrates the photosynthesis process, including diagrams, equations, and real-life implications of its importance.

- Research Paper: Assign students to write a short paper on how photosynthesis affects life in a specific ecosystem (e.g., rainforests, deserts) and what might happen if the process didn't occur there.

**Teacher Self-Evaluation:**

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**WEEK 9: LESSON 5**

**Strand:** Living Things and Their Environment

**Sub Strand:** Nutrition in Plants

**Specific Learning Outcomes:**

**- By the end of the lesson, the learner should be able to:**

1. Outline the procedure for testing the necessity of light for photosynthesis (Starch test).

2. Set up an experiment to show that light is necessary for photosynthesis.

3. Enjoy conducting the experiment.

**Key Inquiry Question:**

How can we determine that light is a necessity for photosynthesis to take place in plants?

**Learning Resources:**

- Lesson notes

- Learner's Textbook

- Laboratory equipment (Ethanol, boiling water, Iodine solution, Petri dish, black paper or aluminum foil, source of heat, forceps)

- Healthy potted plant

**Organisation of Learning:**

**Introduction (5 minutes):**

- Review the previous lesson on plant nutrition and photosynthesis.

- Guide learners to read and discuss relevant content from the textbook, focusing on the role of light in photosynthesis.

**Lesson Development (30 minutes):**

**Step 1:** Identify Requirements

- In groups, learners will identify what materials are necessary for the experiment.

- Discuss the role of each item (e.g., ethanol for testing, iodine for starch detection).

**Step 2:** Outline Procedure

- Each group will outline the procedure for conducting the starch test.

- Emphasize the steps: preparing the plant, boiling it, soaking it in ethanol, and finally testing with iodine.

**Step 3:** Setting Up the Experiment

- Guide the students in setting up their experiments using the identified materials.

- Ensure safety protocols are followed, particularly while handling boiling water and ethanol.

**Step 4:** Observation and Discussion

- Allow groups time to observe the results and discuss their findings.

- Encourage students to record any significant changes and relate them back to the necessity of light in photosynthesis.

**Conclusion (5 minutes):**

- Summarize key points, emphasizing the critical role of light in photosynthesis and how the experiment demonstrated this.

- Conduct a quick interactive quiz asking students to recall what they learned about the procedure and outcomes.

- Prepare learners for the next session by introducing the next topic on the role of chlorophyll in photosynthesis and posing questions for them to think about: "What happens to plants when they do not receive enough light?"

**Extended Activities:**

- Have learners research and present on different types of light conditions (e.g., full sun, partial shade) and their effects on plant growth.

- Encourage students to perform a similar experiment at home with different light sources (like sunlight vs. artificial light) to compare results.

- Create a poster illustrating the complete process of photosynthesis, highlighting the importance of light, water, and carbon dioxide.

**Teacher Self-Evaluation:**

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**WEEK 10: LESSON 1**

**Strand:** Living Things and Their Environment

**Sub Strand:** Nutrition in Plants

**Specific Learning Outcomes:**

**- By the end of the lesson, learners should be able to:**

1. Outline the procedure for testing that chlorophyll is necessary for photosynthesis to occur.

2. Set up an experiment to show that chlorophyll is necessary for photosynthesis.

3. Enjoy carrying out the experiment.

**Key Inquiry Question:**

- How can we determine that chlorophyll is necessary for photosynthesis to take place?

**Learning Resources:**

- Variegated plant

- Iodine solution

- Beaker of boiling water

- Ethanol

- Source of heat

- Laboratory

- Lesson notes

- Learner's textbook

**Organisation of Learning:**

**Introduction (5 minutes):**

- Review the previous lesson on photosynthesis, highlighting the role of chlorophyll and the significance of light.

- Guide learners to read and discuss relevant content from the learning resources, emphasizing their understanding of chlorophyll's role in photosynthesis.

**Lesson Development (30 minutes):**

**Step 1:** Outline the Procedure

- In groups, discuss and outline the procedure to demonstrate that chlorophyll is necessary for photosynthesis. List the steps collectively on a board.

- Key Steps to Discuss:

1. Selection of a variegated plant (one with green and non-green leaves).

2. Use of iodine solution to test for starch production.

**Step 2:** Identify Materials

- In their groups, learners identify and prepare the necessary materials for the experiment (variegated plant, boiling water, ethanol, iodine).

- Each group should assign roles for safety and efficiency (e.g., one person boiling water, others preparing iodine).

**Step 3:** Set Up the Experiment

- Collaboratively, learners will set up the experiment. This involves boiling a leaf, soaking it in ethanol, and then testing it with iodine to observe color changes.

- Ensure all safety precautions are taken, especially when handling hot water and ethanol.

**Step 4:** Observe and Record Findings

- After conducting the experiment, learners should observe the color change that occurs when iodine is applied to the leaf.

- Record their observations, noting which parts of the leaf turned blue-black (indicating starch presence), and discuss what these findings indicate about the role of chlorophyll in photosynthesis.

**Conclusion (5 minutes):**

- Summarize key points learned during the lesson regarding the role of chlorophyll in photosynthesis.

- Engage in an interactive activity, such as a Q&A or a quick quiz, to reinforce the main topics discussed.

- Preview the upcoming topics, such as the process of respiration in plants and how it relates to photosynthesis.

**Extended Activities:**

- Research Assignment: Ask learners to research different types of plants (e.g., green vs. non-green) and how their chlorophyll levels affect their ability to photosynthesize.

- Field Observation: Organize a field trip to observe various plants and check for chlorophyll presence and leaf coloration.

- Creative Poster: Have learners create a poster demonstrating the photosynthesis process, including the role of chlorophyll and the importance of sunlight.

**Teacher Self-Evaluation:**

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**WEEK 10: LESSON 2**

**Strand:** Living Things and Their Environment

**Sub Strand:** Nutrition in Plants

**Specific Learning Outcomes:**

**- By the end of the lesson, students should be able to:**

1.Outline the procedure for testing that carbon (IV) oxide is necessary for photosynthesis to occur.

2. Set up an experiment to demonstrate that carbon (IV) oxide is necessary for photosynthesis to take place.

3. Enjoy carrying out the experiment.

**Key Inquiry Question:**

How can we determine that Carbon (IV) Oxide is necessary for photosynthesis to occur?

**Learning Resources:**

- Variegated plant

- Sodium hydroxide pellets

- Iodine solution

- Petroleum jelly

- Transparent airtight container

- Learner's textbook

- Lesson notes

- Laboratory equipment

**Organisation of Learning:**

**Introduction (5 minutes):**

- Review the previous lesson on photosynthesis.

- Guide learners to read and discuss relevant content from the textbook, emphasizing the role of carbon (IV) oxide in photosynthesis.

**Lesson Development (30 minutes):**

**Step 1:** Discuss the Concept

- In groups, learners should discuss the importance of carbon (IV) oxide in the process of photosynthesis.

- Encourage them to share prior knowledge and formulate hypotheses about the experiment.

**Step 2:** Outline the Procedure

- Groups will outline the step-by-step procedure for testing whether carbon (IV) oxide is necessary for photosynthesis, using their learning resources.

- Guide them to write down the key steps, including materials needed and expected outcomes.

**Step 3:** Prepare for the Experiment

- Each group will gather all the materials listed for the experiment.

- Ensure that every student understands their role in setting up the experiment. Discuss safety considerations when handling chemicals.

**Step 4:** Conduct the Experiment

- Students will collaboratively set up the experiment.

- Allow them time to observe any changes in the plant and record their observations.

- Facilitate a discussion where students compare their results with their initial hypotheses.

**Conclusion (5 minutes):**

- Summarize the key points about the necessity of carbon (IV) oxide in photosynthesis and the steps they took during the experiment.

- Conduct a brief interactive activity, such as a quick quiz or a think-pair-share, to reinforce the key concepts discussed.

- Prepare learners for the next session by previewing upcoming topics, such as factors affecting photosynthesis.

**Extended Activities:**

- Home Experiment: Ask students to set up their own simple photosynthesis experiment using a leafy green plant and variable conditions at home (like light exposure and availability of carbon dioxide) to observe effects on growth or color change.

- Research Assignment: Students can research and present on the role of different gases in the atmosphere and their effects on plant growth, focusing on climate change aspects.

- Creative Project: Students can create a visual poster or digital presentation highlighting the photosynthesis process, including the role of carbon (IV) oxide and other necessary conditions.

**Teacher Self-Evaluation:**

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**WEEK 10: LESSON 3**

**Strand:** Living Things and Their Environment

**Sub Strand:** Nutrition in Plants: Assessment

**Specific Learning Outcomes:**

- By the end of the lesson, the learner should be able to:

1. Attempt assessment questions on the sub-strand: Nutrition in Plants.

**Key Inquiry Questions:**

- What are the different ways plants obtain nutrients?

- How do plants use sunlight in their nutrition process?

- Why is nutrition important for plant growth and development?

**Learning Resources:**

- Assessment books

- Learner's Textbook

- Teacher's Assessment Questions Book

**Lesson Development (30 minutes):**

**Step 1:** Understanding Key Terms

- Begin with a brief discussion to define key terms related to plant nutrition such as "photosynthesis," "chlorophyll," and "nutrients."

- Ask questions to ensure understanding, facilitating a few minutes of whole-class discussion.

**Step 2:** Pair Work - Concept Application

- In pairs, learners will refer to their textbooks to discuss how plants obtain nutrients from soil, air, and sunlight.

- Each pair will list the different nutrients needed by plants and their sources.

**Step 3:** Individual Practice - Assessment Questions

- Distribute assessment questions from the Teacher's Assessment Questions Book.

- Learners will work individually to answer the questions, applying their understanding of the key concepts discussed.

**Step 4:** Review Answers Together

- Once everyone has completed the assessment questions, review the answers as a class.

- Encourage learners to explain their reasoning for each answer, promoting a deeper understanding through discussion.

**Conclusion (5 minutes):**

- Summarize the key points discussed during the lesson, emphasizing the importance of nutrition in plant health and growth.

- Conduct a brief interactive activity, such as a quiz game, to reinforce the main topics discussed.

- Preview the next session on plant reproduction and its relation to nutrition, encouraging learners to think about how these two areas are interconnected.

**Extended Activities:**

- Assign learners to research a specific plant nutrient, its role in plant health, and present their findings in the next class.

- Encourage learners to set up a simple experiment to observe the effects of different nutrients on plant growth using common household plants.

**Teacher Self-Evaluation:**

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**WEEK 10: LESSON 4**

**Strand:** Living Things and Their Environment

**Sub Strand:** Nutrition in Animals

**Specific Learning Outcomes:**

**-By the end of the lesson, learners should be able:**

1. Identify the modes of nutrition in animals.

2. Describe parasitic and saprophytic modes of nutrition in animals.

3. Search the internet for information on parasitic and saprophytic as modes of nutrition in animals.

4. Acknowledge the different modes of nutrition in animals.

**Key Inquiry Question(s):**

- How do different animals feed?

**Learning Resources:**

- Lesson notes.

- Digital devices (tablets, computers).

- Learner's Textbook.

**Organisation of Learning:**

**Introduction (5 minutes):**

- Review Previous Lesson:

- Begin with a quick review of the previous lesson on the basic needs of animals. Ask students questions about what animals need to survive.

- Discuss Key Concepts:

- Introduce the topic of nutrition by asking students how different animals might feed. Briefly outline the importance of nutrition in the animal kingdom.

**Lesson Development (30 minutes):**

**Step 1:** Identify Modes of Nutrition

- Group Activity:

- Divide students into small groups and have them brainstorm various modes of nutrition in animals (e.g., herbivorous, carnivorous, omnivorous, parasitic, saprophytic).

- Each group shares their findings with the class. Write these on the board for visual reference.

**Step 2:** Investigate Parasitic Nutrition

- Research Task:

- In groups, students will use digital devices to research parasitic nutrition. Ask students to find examples of parasitic animals (e.g., tapeworms, leeches).

- Each group should write down key facts about how these animals obtain their nutrients and the impact they have on their hosts.

**Step 3:** Explore Saprophytic Nutrition

- Class Discussion:

- Still in groups, students will switch to researching saprophytic nutrition (e.g., fungi, some bacteria). They should identify examples and describe how these organisms absorb nutrients from dead organic matter.

- Groups can take turns presenting their findings from both types of nutrition to the class.

**Step 4:** Compare and Contrast

- Synthesis Activity:

- Ask students to compare and contrast parasitic and saprophytic modes of nutrition on a Venn diagram. They should discuss similarities and differences in groups and then present to the class.

**Conclusion (5 minutes):**

- Summarize Key Points:

- Recap the different modes of nutrition discussed, highlighting parasitic and saprophytic nutrition. Reinforce the understanding of how these modes function in the ecosystem.

- Interactive Activity:

- Conduct a quick quiz or game (e.g., Kahoot) to reinforce the main topics learned during the lesson.

- Prepare for Next Session:

- Briefly introduce the next topic on the digestive systems of animals, prompting students to think about how the mode of nutrition affects an organism’s digestive process.

**Extended Activities:**

- Research Project:

- Have students choose either a parasitic or saprophytic organism and create a short presentation that covers its habitat, feeding mechanisms, and role in the ecosystem. They can include visuals or even demonstrations if possible.

- Field Study:

- Organize a field trip to a local museum or nature center to observe animals and their nutritive behaviors, if available.

- Creative Writing:

- Ask students to write a short story or a diary entry from the perspective of an animal utilizing either parasitic or saprophytic nutrition.

**Teacher Self-Evaluation:**

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**WEEK 10: LESSON 5**

**Strand:** Living Things and Their Environment

**Sub Strand:** Nutrition in Animals

**Specific Learning Outcomes:**

**- By the end of the lesson, the learner should be able to:**

1. Explain the symbiosis and holozoic modes of nutrition in animals.

2. Search the internet for information on holozoic and symbiosis.

3. Appreciate the different modes of nutrition in animals.

**Key Inquiry Question(s):**

- What is the difference between holozoic and symbiosis modes of nutrition in animals?

**Learning Resources:**

- Lesson notes

- Learner's Textbook

- Digital devices

- Internet

**Organisation of Learning:**

**Introduction (5 minutes):**

- Review the previous lesson about the basic concepts of nutrition in animals.

- Briefly introduce the new concepts of holozoic and symbiotic nutrition.

- Have learners discuss any prior knowledge they may have about these two modes of nutrition.

**Lesson Development (30 minutes):**

**Step 1:** Understanding Holozoic Nutrition

- Provide a definition of holozoic nutrition.

- Discuss how animals, such as humans, obtain nutrients by consuming solid organic matter and breaking it down.

- Encourage students to think of examples (e.g., carnivores, herbivores).

**Step 2:** Exploring Symbiosis

- Define symbiotic nutrition (mutualism, commensalism, and parasitism).

- Discuss how some animals benefit from living in close association with others, like clownfish and sea anemones.

- Ask students to share examples and discuss the benefits or drawbacks of these relationships.

**Step 3:** Group Research Activity

- In groups, learners will use digital or print resources to search for more information on holozoic and symbiosis, noting key findings, differences, and examples.

- Facilitate group discussions and ensure that they explore the specifics of each mode of nutrition.

**Step 4:** Comparison and Discussion

- Bring the class back together to share findings.

- Engage learners in a class discussion to compare and contrast the holozoic and symbiotic nutrition modes, asking guiding questions to stimulate critical thinking (e.g., "In what environments might these modes of nutrition be advantageous?").

**Conclusion (5 minutes):**

- Summarize the key points learned about holozoic and symbiotic nutrition.

- Conduct an interactive activity, such as a "Think-Pair-Share," where learners discuss which mode of nutrition they find more interesting and why.

- Preview the next session, introducing the topic of nutrient cycles and how different organisms interact within those cycles.

**Extended Activities:**

- Creative Project: Students can create a poster or infographic that compares holozoic and symbiotic nutrition, including visual aids, definitions, and examples.

- Research Assignment: Assign students to research a specific animal that exhibits either holozoic or symbiotic nutrition and present their findings to the class.

- Field Observation: If applicable, students can observe local wildlife and note examples of different nutritional strategies in the ecosystem.

**Teacher Self-Evaluation:**

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**WEEK 11: LESSON 1**

**Strand:** Living Things and Their Environment

**Sub Strand:** Nutrition in Animals

**Specific Learning Outcomes:**

**- By the end of the lesson, learners should be able to:**

1. Define the term "Dentition."

2. Describe homodont and heterodont dentition in animals.

3. Search the internet for information related to homodont and heterodont dentition.

4. Acknowledge the different types of dentition in animals.

**Key Inquiry Question(s):**

- What is the difference between homodont and heterodont dentition?

**Learning Resources:**

- Lesson notes

- Digital devices (tablets/laptops)

- Learner's Textbook

**Organisation of Learning:**

**Introduction (5 minutes):**

- Review the previous lesson on animal nutrition and the importance of teeth in that context.

- Guide learners to read and discuss relevant content from the learning resources that define dentition and introduce the types of dentition (homodont and heterodont).

**Lesson Development (30 minutes):**

**Step 1:** Definition of Dentition

- Begin by asking students if they know what dentition means and record their responses.

- Introduce the definition of dentition as the arrangement of teeth in the mouth of an animal.

- Provide examples of different species to illustrate the concept.

**Step 2:** Homodont Dentition

- Divide learners into small groups and instruct them to discuss what homodont dentition is (having similar types of teeth).

- Ask each group to identify examples of animals with homodont dentition (e.g., alligators).

- Each group should present their findings, focusing on the characteristics and nutritional roles of these teeth.

**Step 3:** Heterodont Dentition

- Discuss the concept of heterodont dentition (having different types of teeth).

- Guide students to research and discuss the functions of various teeth types (incisors, canines, molars) in mammals.

- Discuss examples of animals with heterodont dentition, categorizing them as carnivores, herbivores, and omnivores.

- Encourage learners to think about how the type of dentition affects these animals’ diets and feeding behaviors.

**Conclusion (5 minutes):**

- Summarize key points about homodont and heterodont dentition.

- Conduct an interactive activity, such as a quick quiz or a group discussion to reinforce the concepts learned.

- Prepare learners for the next session by introducing the topic of digestive systems in animals and posing questions to consider, like "How do teeth types influence digestion?"

**Extended Activities:**

- Research Project: Assign learners to choose an animal and create a presentation that compares its dentition with another animal. They should include visuals like diagrams or photos.

- Create a Diagram: Ask students to create a labeled diagram of a mammal's mouth showing different types of teeth, along with a short description of their functions.

- Field Trip: If feasible, organize a trip to a local zoo or aquarium to observe various animal dentition firsthand and discuss the implications on nutrition.

**Teacher Self-Evaluation:**

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**WEEK 11: LESSON 2**

**Strand:** Living Things and Their Environment

**Sub Strand:** Nutrition in Animals

**Specific Learning Outcomes:**

**- By the end of the lesson, learners should be able to:**

1. Identify and describe the different types of nutrition in animals (e.g., herbivores, carnivores, omnivores).

2. Understand the process of digestion and nutrient absorption.

3. Explain the role of various organs involved in the nutrition process.

**Key Inquiry Question(s):**

- How do different animals obtain and process their food?

- What are the main stages of digestion, and why are they important for growth and energy?

**Learning Resources:**

- Textbook chapters on animal nutrition

- Diagrams of the digestive system of various animals

- Short video clips illustrating digestion in real time

**Organisation of Learning:**

**Introduction (5 minutes):**

- Review the previous lesson on ecosystems.

- Guide learners to read and discuss relevant content from the learning resources, focusing on key concepts such as the importance of nutrition in the survival and functioning of animals.

**Lesson Development (30 minutes):**

**Step 1:** Classification of Animals by Diet

- Discuss and define herbivores, carnivores, and omnivores.

- Use visual aids to showcase examples of each type of animal.

- Prompt students to categorize a list of animals based on their diets.

**Step 2:** The Digestive Process

- Introduce the major organs involved in digestion: mouth, stomach, intestines, and accessory organs (liver, pancreas).

- Utilize diagrams to illustrate the digestive system and explain the function of each part in breaking down food and absorbing nutrients.

**Step 3:** Nutrient Absorption

- Explain how the body absorbs essential nutrients from digested food.

- Engage learners in a short discussion about the importance of different nutrients—carbohydrates, proteins, fats, vitamins, and minerals—and their roles in the body.

**Step 4:** Comparison Activity

- In small groups, have students compare and contrast the digestive systems of two selected animals (e.g., a cow and a hawk).

- Each group presents their findings to the class.

**Conclusion (5 minutes):**

- Summarize key points: types of nutrition, the digestive system, and the absorption of nutrients.

- Conduct a brief interactive quiz using a digital tool (like Kahoot) to reinforce the main topics discussed.

- Prepare learners for the next session by previewing upcoming topics, such as the interaction between diet and health.

**Extended Activities:**

- Research Assignment: Have students choose an animal and create a presentation about its nutritional needs, feeding habits, and specific adaptations related to its diet.

- Hands-on Activity: Conduct a simple experiment to compare the digestion rates of different types of food using a model digestive system (e.g., using jars with different types of food and simulating the digestive process with saliva and acids).

**Teacher Self-Evaluation:**

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**WEEK 11: LESSON 3**

**Strand:** Living Things and Their Environment

**Sub Strand:** Nutrition in Animals

**Specific Learning Outcomes:**

**- By the end of the lesson, learners should be able to:**

1. Identify the different types of teeth in animals.

2. Describe the structure of the different types of teeth in animals.

3. Draw the different types of teeth in animals.

4. Acknowledge the function of the different types of teeth in relation to animal diets.

**Key Inquiry Question:**

- Which types of teeth are found in animals?

**Learning Resources:**

- Lesson notes

- Digital devices

- Pictures/photos

- Learner's Textbook

- Charts

**Organisation of Learning:**

**Introduction (5 minutes):**

- Begin by reviewing the previous lesson focused on animal nutrition. Encourage students to recall the importance of different dietary habits among animals.

- Guide learners to read a short passage in their textbooks about teeth in animals and discuss what they already know about different types of teeth, emphasizing key concepts.

**Lesson Development (30 minutes):**

**Step 1:** Introduction to Types of Teeth

- Present a variety of charts highlighting different types of teeth (incisors, canines, premolars, molars) in various animals.

- Divide students into small groups and assign each group a type of animal (e.g., herbivore, carnivore, omnivore) to focus on.

- Ask groups to discuss the specific types of teeth their animal has and how these relate to their diet. Encourage them to take notes.

**Step 2:** Discussion on Structure

- Have each group share their findings with the class.

- Facilitate a class discussion about the structure of each type of tooth. Highlight details such as sharpness, flatness, and size, and explain how these features help animals in chewing and eating different types of food.

**Step 3:** Individual Drawing Activity

- Ask each student to individually draw and label the different types of teeth they discussed in their groups. Encourage creativity and depth of detail, including the shape and structure of each tooth type.

**Conclusion (5 minutes):**

- Summarize the key points covered during the lesson, reinforcing the different types of teeth and their functions.

- Conduct a brief interactive quiz where students match animals to their respective teeth types to reinforce learning.

- Preview the next session where learners will explore how teeth relate to animal adaptations in different environments.

**Extended Activities:**

- Research Project: Ask students to research a specific animal and create a presentation on its teeth structure and adaptations to its diet.

- Field Observation: Encourage students to observe pets or animals in their environment to note the differences in teeth and infer diets based on observations.

- Creative Writing: Have students imagine they are an animal and write a short story about their daily life, incorporating how their teeth help them survive in their habitat.

**Teacher Self-Evaluation:**

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**WEEK 11: LESSON 4**

**Strand:** Living Things and Their Environment

**Sub Strand:** Nutrition in Animals

**Specific Learning Outcomes:**

**- By the end of the lesson, learners should be able to:**

1. Outline the functions of the different types of teeth in animals.

2. Discuss the functions of the different types of teeth in animals.

3. Prepare posters showing the functions of the different types of teeth in animals.

4. Acknowledge the functions of the different types of teeth.

**Key Inquiry Question:**

- What are the functions of the different types of teeth in animals?

**Learning Resources:**

- Lesson notes

- Digital devices (tablets, computers)

- Learner's Textbook

- Charts

**Organisation of Learning:**

**Introduction (5 minutes):**

- Briefly review the previous lesson on nutrition in animals.

- Guide learners to collaboratively read and discuss relevant content from their textbooks and lesson notes, while focusing on understanding the various types of teeth in animals.

**Lesson Development (30 minutes):**

**Step 1:** Group Formation

- Divide the class into small groups of 4-5 students. Each group will collaborate to research tooth types.

**Step 2:** Research Activity

- Use digital devices or printed resources to find information on the functions of different types of teeth: incisors, canines, premolars, and molars. Groups will take notes on the information they gather.

**Step 3:** Group Discussion

- In their groups, students will discuss their findings, focusing on how each type of tooth aids in the animals' diet and feeding habits. Encourage them to consider examples from various animals.

**Step 4:** Poster Preparation

- Each group will create a poster or chart that visually represents the functions of each type of tooth, incorporating their research and discussion points. Posters should be colorful and include illustrations or diagrams if possible.

**Conclusion (5 minutes):**

- Summarize the key points discussed, emphasizing the functions of incisors, canines, premolars, and molars.

- Conduct a brief interactive activity (raise their hands for correct answers or quick quizzes) that reinforces the main topics covered.

- Preview the next lesson on digestive systems in animals, highlighting any questions they should consider.

**Extended Activities:**

- Research investigation: Assign students to choose an animal and prepare a short report on how its teeth relate to its diet and habitat.

- Classroom debate: Organize a debate on the importance of dental health in animals and how it affects their survival and nutrition.

- Creative writing: Have students write a short story from the perspective of an animal describing its feeding habits and the role of its teeth.

**Teacher Self-Evaluation:**

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**WEEK 11: LESSON 5**

**Strand:** Living Things and Their Environment

**Sub Strand:** Nutrition in Animals

**Specific Learning Outcomes:**

**- By the end of the lesson, learners should be able to:**

1. Identify the dentition characteristics of different animals.

2. Classify animals based on their dentition.

3. Have fun classifying different animals based on their dentition.

**Key Inquiry Question:**

- How can you classify animals based on their dentition?

**Learning Resources:**

- Lesson notes

- Learner's Textbook

- Models/Specimens/Charts

- Digital media

**Organisation of Learning:**

**Introduction (5 minutes):**

- Review Previous Lesson: Begin by recapping what was covered in the last class related to the basic needs of animals.

- Discussion: Encourage a brief discussion about how nutrition varies among different types of animals. Use this to transition into dentition.

**Lesson Development (30 minutes):**

**Step 1:** Introduction to Dentition Characteristics

- Briefly explain dentition and its importance. Highlight the main types of dentition: herbivores, carnivores, and omnivores.

- Guide students through the lesson notes and textbook, pointing out specific examples of teeth types and their functions.

**Step 2:** Group Research Activity

- Divide the class into small groups and assign each group a category of animal (herbivores, carnivores, or omnivores).

- Provide each group with resources such as charts, models, or access to digital media.

- Instruct them to outline and note down the dentition characteristics of animals within their category.

**Step 3:** Classification Exercise

- Each group will create a mini-poster or digital presentation based on their findings.

- They will classify animals based on dentition or visual aids and prepare to share their work with the class.

**Step 4:** Sharing Findings

- Allow each group to present their classification and findings to the rest of the class.

- Encourage students to ask questions and provide feedback to enhance understanding.

**Conclusion (5 minutes):**

- Summarize Key Points: Highlight the characteristics of the different dentitions and the significance of these adaptations in determining an animal’s diet.

- Interactive Activity: Play a quick game where students match animals to their types of dentition using flashcards.

- Preview Next Session: Introduce the next topic on food chains and how nutrition impacts ecosystems, and propose questions for them to ponder: "How does the diet of an animal affect its role in the food chain?"

**Extended Activities:**

- Field Study: Encourage students to visit a local zoo or aquarium and observe different animals. They should take notes on the types of dentition observed and classify the animals accordingly.

- Home Project: Ask students to create a small scrapbook or digital presentation, including pictures and descriptions of local animals classified by their dentition type.

- Guest Speaker: Invite a veterinarian or a zoologist to talk about how dentition affects the health and behavior of animals.

**Teacher Self-Evaluation:**