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| 1. **OBJECTIVES** |  |
| 1. **Content Standards** | The learners demonstrate understanding of the factors that affect climate, and the effects of changing climate and how to adapt accordingly. |
| 1. **Performance Standards** | The learners should be able to participate in activities that reduce risks and lessen effects of climate change. |
| 1. **Learning Competencies** | Describe certain climatic phenomenon that occur on a global level.(**S9ES-IIIe-31**)  **Learning Objectives:**  At the end of this lesson, the students should be able to:   * Recognize the major greenhouse gases; * Explain how greenhouse gases trap heat; and * Demonstrate simple ways to reduce greenhouse gas emissions. |
| 1. **GAD Integration/ Values Integration/Comprehensive Sexuality Education Integration** | * Cooperation * Analysis * Creativity * Inclusive |
| 1. **CONTENT** | Greenhouse effect |
| 1. **LEARNING RESOURCES** 2. **References** | 1. Happy Learning English. (2022, April 6). *Climate change and the greenhouse effect* | Educational videos for kids [Video]. YouTube. https://www.youtube.com/watch?v=NM-sgVmBL\_A<https://youtu.be/NM-sgVmBL_A?si=sgrE3UCmSrcTJ-0H> 2. wikiHow. (2020, July 1). *How to reduce your greenhouse gas emissions* [Video]. YouTube. <https://www.youtube.com/watch?v=5uNmh5k1Z0I> |
| **1. Teachers Guide pages** | Science 9 – Unit 3, Module 2: Climate, pp.152-153 |
| **2. Learner’s Material pages** | Science 9 – Unit 3, Module 2: Climate, pp.198-200 |
| 1. **Materials** | * **For Teacher:** * PowerPoint Presentation/chalk board, Manila Paper, Marker, Adhesive Tape, Laptop, television, speaker * **For Learners:** * Pen/pencil, paper |
| 1. **Other Resources** | PowerPoint Presentation, Video Presentation, Pictures, Checklist, Internet Resources, Print-outs, Manila Papers, Permanent Markers |

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| 1. **PROCEDURES** |  | **Teacher's Activity** | **Student's Activity** |
| **Preliminaries** |  | **A. Greeting**  “Good morning, 9- (Gumamela, Rose, Sampaguita)!” “How are you today?”  “Class, today is Friday, or let's just say Fri-yey, because today is another amazing day to learn something new.”  **B. Opening Prayer**  “Before we start our lesson this morning, may I ask the student of the day (name of the learner) to lead us in prayer.”  “Before you take your seat, kindly check your chairs if there are some trashes and also kindly arrange your chairs.”  **C. Checking of Attendance**  “Again, good morning, class!”  “May I ask who are not around today? Row 1…2…3…4…5…6?”  **D. Classroom Rules**  “Before we proceed to our lesson, let us recall our five classroom rules.  Who can give me the first rule?  How about the second rule?  What is our third rule?  And, our fourth rule?  Lastly, our fifth rule?  Very good, class. Can I expect you to follow all these classroom rules? Sure?” | “Good morning, Ma’am Jo!”  “Good, Ma’am”  “Happy Fri-yey”  (Learner will lead the prayer)  (Learners will arrange their chairs and pick up some trashes)  “Good morning, Ma’am!”  “None, Ma’am”  Sit properly.  Listen attentively.  Speak politely.  Participate actively.  Respect everybody.  “Yes, Ma’am!” “Sure, na sure!” |
| 1. **Reviewing previous lesson or presenting the new lesson** | **ELICIT** | “Last meeting, we've tackled about all the factors that affects the climate.  Now, let's move to another fun and interesting topic.  Riddles:   * I trap heat from the Sun and warm the Earth's surface, but too much of me can cause trouble. What am I? * I'm a gas that helps plants grow, but when there's too much of me in the atmosphere, I contribute to the greenhouse effect. What gas am I? * I'm a process that occurs naturally on Earth, but human activities have greatly accelerated me, leading to an intensified greenhouse effect. What am I? | “Answer may vary” |
| 1. **Establishing a purpose for the lesson** | **ENGAGE** | Begin the lesson by asking students if they have ever heard about the greenhouse effect. Encourage a brief class discussion.  The teacher will show an image related to the greenhouse effect to engage students' interest in the topic. Ask students to share their initial thoughts and ideas about what they saw.    The teacher will show a picture of a greenhouse and the learners will answer the guide questions:   1. What do you see in the image? 2. Do you know how it works? If yes, please share your knowledge of how greenhouses work with the class.   “Excellent observation class!” This is our topic for today and it all about the greenhouse effect, a climatic phenomenon that occur on a global level, are you ready to learn now class? | (The student will response based on their observation)  “Ma’am, it is like a house with green plants”  ‘Yes, ma’am. It is usually a glass- or plastic-enclosed [framed structure](https://www.britannica.com/technology/framed-building) that is used for the production of fruits, vegetables, flowers, and any other plants that require special conditions of temperature.”  “Yes, ma’am” |
| 1. **Presenting examples/ instances of the new lesson** |
| 1. **Discussing new concepts and practicing new skills #1** | **EXPLORE** | ***“The Greenhouse Effect”***  The greenhouse effect is the process through which heat is trapped near Earth's surface by substances known as 'greenhouse gases.'  Gases that trap heat in the atmosphere are called greenhouse gases.  The teacher will present short video clip to illustrate how greenhouse gases trap heat. Video Link:  <https://youtu.be/NM-sgVmBL_A?si=sgrE3UCmSrcTJ-0H>    Guide questions:   1. What is a greenhouse gas? 2. Is there a mention of gas in this particular video? 3. How do greenhouse gases trap heat?   “Excellent class!”  **Guide Questions:**  **1.** What happens to water vapor as it rises over the mountain?  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  **2.** Which side of the mountain experiences low temperature?  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  **3.** Which side of the mountain experiences high temperature?  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  **4.** What happens when air becomes warmer and drier as it moves down the leeward side?  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  **5.** How does topography affect climate?  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  What is a greenhouse gas? It is a gas that absorbs and emits radiant energy within the thermal infrared range. It causes the greenhouse effect on our planets. The primary greenhouse gases in  Earth's atmosphere is water vapor (H2O), carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), and ozone (O3).    [**Carbon dioxide (CO2)**](https://www.epa.gov/ghgemissions/overview-greenhouse-gases#carbon-dioxide)**:** Carbon dioxide enters the atmosphere through burning fossil fuels (coal, natural gas, and oil), solid waste, trees and other biological materials, and also as a result of certain chemical reactions (e.g., cement production). Carbon dioxide is removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle.   * [**Methane (CH4)**](https://www.epa.gov/ghgemissions/overview-greenhouse-gases#methane): Methane is emitted during the production and transport of coal, natural gas, and oil. Methane emissions also result from livestock and other agricultural practices, land use, and by the decay of organic waste in municipal solid waste landfills. * [**Nitrous oxide (N2O)**](https://www.epa.gov/ghgemissions/overview-greenhouse-gases#nitrous-oxide): Nitrous oxide is emitted during agricultural, land use, and industrial activities; combustion of fossil fuels and solid waste; as well as during treatment of wastewater. * [**Fluorinated gases**](https://www.epa.gov/ghgemissions/overview-greenhouse-gases#f-gases): Hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and nitrogen trifluoride are synthetic, powerful greenhouse gases that are emitted from a variety of household, commercial, and industrial applications and processes.   “Did you now, class, understand the greenhouse effect?  “Very good class!” | “Greenhouse gases (also known as GHGs) are gases in the earth’s atmosphere that trap heat.”  “Yes, ma’am, CO2, methane, N20 and fluorinated gases”.  “Ma’am, the greenhouse's glass walls retain heat from the sun. On Earth, the greenhouse effect works much in the same way. Heat is trapped by atmospheric gases like carbon dioxide in a manner similar to a greenhouse's glass roof.  “Yes, ma’am” |
| 1. **Discussing new concepts and practicing new skills #2** | **EXPLORE** | The teacher will show video on demonstrating the simple ways.  wikiHow. (2020, July 1). How to reduce your greenhouse gas emissions [Video]. YouTube. <https://www.youtube.com/watch?v=5uNmh5k1Z0I>    “How You Can Help Reduce Greenhouse Gas Emissions at Home?”  “Excellent class!” | (The students will response base on the observation)  “Ma’am, the best method to reduce waste is to avoid creating it in the first place. Follow the three R's: reduce, reuse, and recycle to save money, conserve natural resources, and reduce greenhouse gas emissions. Think green before you go shopping.” |
| 1. **Developing mastery** | **EXPLAIN** | **Question and Answer**  The teacher will ask some students to answer the following questions:  ***“What I Have Learned?”***  Learners will be asked a question prior to their understanding of the lesson.   * 1. What is greenhouse effect?   2. What do you think are the reasons for these phenomena?   3. What can be done to reduce greenhouse gases?   The teacher will say after the student’s response, “Excellent class!” | “The Greenhouse effect refers to the trapping and emission of radiation by greenhouse gases in the atmosphere. Without this process, the Earth would be either extremely cold or extremely hot, making life impossible. The greenhouse effect is a naturally occurring phenomena.”  “Human activities are responsible for almost all of the increase in greenhouse gases in the atmosphere. The largest source of greenhouse gas emissions from human activities from burning fossil fuels for electricity, heat, and transportation”  “Greenhouse gases can be reduced by phasing out fossil fuels, such as coal, oil and gas, and moving to renewable energy, such as [**solar**](https://www.nationalgrid.com/stories/energy-explained/how-does-solar-power-work) and [**wind**](https://www.nationalgrid.com/stories/energy-explained/how-does-wind-turbine-work).  We can all play a part in protecting our planet, from simple daily changes, like reusing and recycling, to bigger lifestyle decisions like switching to [**electric vehicles**](https://www.nationalgrid.com/stories/journey-to-net-zero/5-myths-about-electric-vehicles-busted).” |
| 1. **Finding practical application of**   **concepts and skills in daily living** | **ELABORATE** | Guide Questions:   1. Would you rather live in a world with no greenhouse effect or a world with an extreme greenhouse effect? Explain your choice. 2. Would you rather have stricter regulations on greenhouse gas emissions or rely on individual actions to combat the greenhouse effect? Justify your answer. 3. Would you rather invest in renewable energy sources or focus on developing technologies to capture and store greenhouse gases? Why?   The teacher will say “Thank you for sharing class!” | Answers may vary  (The student will response based on their learnings) |
| 1. **Making generalization and abstractions about the lesson** | **ELABORATE** | To summarize what you have learned, complete the following statements.  Choose your answer in the word pool below.  1. \_\_\_\_\_\_\_\_\_\_\_\_is a gas that absorbs and emits radiant energy within the thermal infrared range.  2. \_\_\_\_\_\_\_\_\_\_\_ serves as the glass walls that trap the Sun's heat.  3. The greenhouse gases are \_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_.  4. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are some climatic phenomena that occur on a global level. 5. As carbon dioxide \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, global temperature also increases.  carbon dioxide methane ozone Water vapor nitrous oxide  Greenhouse Greenhouse gases Increases  Increasing of temperature increasing of carbon dioxide  “Did you now, class, understand the lesson even more? | (The student will response according to the activity)  “Yes, ma’am” |
| 1. **Evaluating learning** | **EVALUATE** | “Now that you’ve learned about the topography and ocean currents that affects climate, it’s time to assess your learning. Kindly bring out ¼ whole sheet of paper for your short test.  True/False Questions about Greenhouse Effect   1. True or False: The greenhouse effect is a natural process that helps to regulate Earth's temperature by trapping heat in the atmosphere. 2. True or False: Greenhouse gases, such as carbon dioxide and methane, contribute to the greenhouse effect by absorbing and re-emitting infrared radiation. 3. True or False: Human activities, such as burning fossil fuels and deforestation, are increasing the concentration of greenhouse gases in the atmosphere and amplifying the greenhouse effect. 4. True or False: The greenhouse effect is a negative phenomenon that solely leads to global warming and climate change. 5. True or False: The greenhouse effect is necessary for life on Earth, as it maintains a suitable temperature for various ecosystems to thrive.   “Alright, who answered all the questions correctly?”  “Excellent class! give yourself a clap! | (The students raised their hands who got the perfect scores”  “Me! Ma’am” |
| 1. **Additional activities for application or remediation** | **EXTEND** | **Assignment**    Create a labeled diagram illustrating the greenhouse effect. Include the Earth's atmosphere, incoming solar radiation, greenhouse gases, and the process of trapping heat. Use appropriate labels and colors to clearly depict each component of the greenhouse effect.  Criteria for Assessment: Accurate representation of the greenhouse effect components and their relationships. Clear labeling of each component in the diagram. Effective use of colors to differentiate between different elements. Neatness and organization of the diagram.  “The submission of your assignment will be on Monday”  “Any questions or clarifications? If there’s nothing more, let’s call it a day. Thank you for listening and I do hope you learned something. Before you leave, kindly arrange the chairs and check if there are some trashes.  Again, thank you 9- (Gumamela, Rose, Sampaguita) and never forget to always shine bright like a Scimazing. Class dismissed!” | “Thank you and good bye, Ma’am Jo.” |
| 1. **REMARKS** |  |  |  |
| 1. **REFLECTION** |  |  |  |
| 1. **No. of learners who earned 80% in the evaluation** |  |  |  |
| 1. **No. of learners who require additional activities for remediation who scored below 80%** |  |  |  |
| 1. **Did the remedial lessons work? No.**   **of learners who have caught up with the lesson** |  |  |  |
| 1. **No. of learners who continue to require remediation** |  |  |  |
| 1. **Which of my teaching strategies worked well? Why did this work?** |  |  |  |
| 1. **What difficulties did I encounter which my principal or supervisor can help me solve?** |  |  |  |
| 1. **What innovation or localized**   **materials did I use/discover which I wish to share with other teachers?** |  |  |  |

Prepared by:

Jolina S. Dela Cruz

Teaching Intern

Checked by:

Jimmy A. Beltran

Cooperating Teacher