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| **Learning Planner** |
| **Subject** | *General science* | **Week** | *14* | **Duration** | *180 min* | **Form** |  *SHS 1* |
| **Strand** | VIGOUR BEHIND LIFE | **Sub-Strand** | Powering the future with energy forms. |
| **Content Standard** | Demonstrate understanding of forms of energy, sources, their generation and effects on the environment. |
| **Learning Outcome(s)** | Relate forms of energy to their sources and their generation |
| **Learning****Indicator(s)** | Design and build Solar panel using locally available materials. |
| **Essential Question(s)**  | What factors ought be considered when setting up solar panels in Ghana?What impact has solar solar panel installation on the environment?What materials will be needed to demonstrate solar panel installation to learners? |
| **Pedagogical Strategies** | * Collaborative learning
* Talk-for-learning approaches
* Demonstration
* Think-pair share
* Project-based approach
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| **Teaching & Learning Resources** | * Prototypes of solar panels
* Charts, pictures, and simulations of various forms of electricity generation.
* Internet resources such as (https://www.youtube.com/watch?v=9BgDt407uQc; https://www.youtube.com/watch?v=lxoHqV2fMK4)
* Different appropriate materials from the environment.
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| **Key Notes on Differentiation** |
| * *Learning Task:*
* *Identify factors to be considered in setting up solar panels in Ghana.*
* *What is the Impact of environmental factors of solar panel installation?*
* *Why is regular cleaning of the solar panels important?*

*Pedagogical Exemplars:** Provide visual aids such as detailed maps showing the geographical distribution of solar panel installations across Ghana to learners.
* Use diagrams and concept maps illustrating the setup process of solar panels, including placement, orientation, and connection to the electrical system.
* Show pictures of existing solar projects in different regions of Ghana to demonstrate real-world applications and inspire visual learners.
* Put learners into mixed-ability groups to collaboratively analyse and interpret the detailed maps showcasing solar panel installations in Ghana, encouraging teamwork and information sharing.
* Provide opportunities for group discussions to create concept maps illustrating the setup process of solar panels, allowing for diverse perspectives and solutions.
* Provide criteria to help learners do group presentations where learners showcase pictures of existing solar projects in Ghana, fostering collaborative learning and collective insight into real-world solar applications.
* Learners explore the environmental factors unique to Ghana in mixed ability groups, such as weather patterns, sunlight intensity, and terrain, and how these impact the effectiveness of solar panel installations. Learners reflect and share their findings for peer review.
* Engage learners in group projects where learners work in teams to design a solar panel installation plan for a hypothetical Ghanaian community.
* Assign specific roles within the group, such as project manager, technical expert, and financial analyst, to simulate a real-world collaborative environment.
* Encourage learners to consider sunlight exposure, energy demand, budget constraints, and community engagement when developing their solar panel installation proposal.
* Through hands-on activities, put learners in mixed-ability groups where learners clean and maintain a small-scale solar panel setup, simulating the conditions and challenges faced in Ghana.

*Key Assessment (DoK):** *Level 2: Identify and describe routine maintenance tasks required to keep solar panels clean and functioning effectively, such as regular inspection, cleaning, and monitoring of system performance*
* *Level 3: Create a visual diagram or flowchart illustrating the installation process of solar panels, highlighting key components and safety protocols*
* *Evaluate the critical factors to consider when determining the optimal placement and orientation of solar panels for maximum sunlight exposure and energy efficiency, etc.*
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| **Keywords** | Connect, voltage, encapsulate, design, Solar panel/cell, etc. |
| **Lesson 1****Advantages and Disadvantages of Solar Energy to the Economy of Ghana** |
| **Main Lesson drawing on Concepts, Skills and Competencies to reinforce as in the Subject Teacher Manual** |
| ***Teacher Activity***  | ***Learner Activity*** |
| **Starter *Activity (10 minutes)*** *As.. learners to write down the definition of energy.* |
| ***Introductory Activity (15minutes)****Put learners into mixed-ability groups to collaboratively analyse and interpret the detailed maps showcasing solar panel installations in Ghana.****Activity 1 (40 minutes)***1. *Show video of solar panel installation to learners.*

***Activity 2 (40 minutes)***1. *Ask learns in their mixed ability groups to discuss and create concept maps, illustrating the setup process of solar panels.*

*Hint. Allow diverse perspectives and solutions.*1. *Ask learners in their mixed groups to do presentations showcasing pictures of existing solar projects in Ghana.*
2. *Ask learners in their mixed groups to search the internet and note down the factors to consider* when setting up solar panels in Ghana
 | ***Introductory Activity (15minutes)***1. *Learners seated in their mixed ability groups*

***Activity 1*** ***learners watch video of solar panel installation******Activity 2*** 1. *Discuss and create concept maps, illustrating the setup process of solar panels.*
2. *Learners do presentation showcasing pictures of existing solar projects in Ghana.*
3. Learners *search the internet and note down the factors to consider* when setting up solar panels in Ghana.
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| **Assessment DoK aligned to the Curriculum and Subject Teacher Manual** |
| * *Level 3: Create a visual diagram or flowchart illustrating the installation process of solar panels.*
* *Level 3:Evaluate the critical factors to consider when determining the optimal placement and orientation of solar panels for maximum sunlight exposure and energy efficiency in Ghana.*
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| **Lesson Closure** ***In completing this part, refer to the Essential Questions to check that learning has taken place.*** |
| ***Activity (15 minutes)*** *Using Pass-that-question, ask learners to write any question on the lesson.**Summarize the lesson highlighting the salient points.*  |
| **Reflection & Remarks** |
| *Reflection**Remarks* |
| **Lesson 2****Advantages and Disadvantages of Solar Energy to the Economy of Ghana** |
| **Main Lesson drawing on Concepts, Skills and Competencies to reinforce as in the Subject Teacher Manual** |
| ***Teacher Activity***  | ***Learner Activity*** |
| **Starter *Activity (10 minutes)***  *Ask learners to sing the National Anthem* |
| ***Introductory activity (25 minutes)***1. *Put learners in their mixed gender and mixed ability groups*

***Activity 1 (25 minutes)***1. *In their mixed gender and mixed ability groups assign specific roles within the group, to learners to research on and present their findings with the help of their Tablets.*

*Hint. project manager**Technical expert.**Financial analyst.* ***Activity 2 (25 minutes)***1. *Guide learners in their mixed-gender and mixed ability groups to come out with ways of maintaining solar panel*
 | ***Introductory activity (25 minutes)***1. *Learners seated in their mixed gender and mixed ability groups.*

***Activity 1***1. *Llearners research on their individual roles and present their findings.*

***Activity 2*** 1. *Learners discuss the various ways of maintaining solar panel*
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| **Assessment DoK aligned to the Curriculum and Subject Teacher Manual** |
| * Level 2: *Identify and describe routine maintenance tasks required to keep solar panels clean and functioning effectively.*
 |
| **Lesson Closure** ***In completing this part, refer to the Essential Questions to check that learning has taken place.***  |
| ***Activity (15 minutes)***  *Using Pass-that-question, ask learners to write any question on the lesson.**Summarize the lesson highlighting the salient points.* |
| **Reflection & Remarks** |
| *Reflections**Remarks* |