Solar-Powered Vehicle

NGSS Standard:
3-PS2-4 Forces and Interactions
Concept: Renewable Energy Sources
Grade Level: 4-6
Subject: STEM / Engineering
Date: [Insert Date]
Duration: 3 days
Lesson Focus:
Students will learn about renewable energy sources and how they are applied in engineering to create sustainable solutions. In this lesson, they will build a small solar-powered vehicle to understand how solar energy can be used to power machines.
Materials:

- Small solar panels
- Motors
- Plastic or cardboard for the vehicle body
- Wheels
- Straws or skewers for axles
- Tape, glue, or hot glue gun
- Small wires
- Scissors
- Ruler

Lesson Objectives:

- Understand the concept of renewable energy, focusing on solar power.
- Design and build a small solar-powered vehicle.
- Test the solar-powered vehicle and make modifications to improve performance.
- Explain how solar power is used in engineering.

Procedures:

1. **Introduction:**
    - Begin by introducing the concept of renewable energy, explaining what it is and why it's important for the environment. Discuss solar energy as one example of renewable energy, and explain how it can be used to power vehicles.
    - Show examples of solar-powered devices, such as calculators or solar lights.
    - Explain the task: students will design and build their own solar-powered vehicles using a small solar panel.
2. **Experiment (Building the Vehicle):**
    - Provide students with materials (solar panel, motor, plastic/cardboard, wheels, etc.).
    - Instruct students to design and assemble their solar-powered vehicle. They will attach the solar panel to the vehicle, connect it to the motor, and ensure that the wheels are properly attached.
    - Allow students to test their vehicles outside or under a strong light source to see how they move.

3. **Observation:**
    - Have students observe how the solar-powered vehicle moves. Does it move quickly or slowly? What happens when the light is weaker or stronger?
    - Encourage students to discuss how sunlight (or a strong light source) powers the vehicle and how this relates to solar energy.
4. **Generalization:**
    - Ask students to think about how solar energy can be used in other engineering applications. How might solar power be used in larger vehicles or buildings? Discuss the importance of renewable energy in solving environmental issues.
5. **Assessment:**
    - Evaluate the solar-powered vehicles based on how well they were built and how effectively they move under the light. Assess students' understanding through a short quiz or discussion about the engineering process and renewable energy concepts.

Note 1: Safety:

- Students should use scissors and glue with care to avoid injury. Be sure to supervise the use of the hot glue gun. Remind students not to touch the solar panel's connections directly to avoid any electrical risks.

Note 2: Accommodation for ELL/ESE:

- Provide visual aids, diagrams, and step-by-step instructions to help ELL and ESE students follow along with the activity. Pairing students up with peers who are proficient in the language can also support their understanding. Additionally, ensure that instructions are clear and given in simple, direct language.