Solar-Powered Vehicle

NGSS Standard: 3-PS2-4 Forces and Interactions
Project Title: Building a Solar-Powered Vehicle
Objective: Students will design and build a small vehicle powered by solar energy to understand how renewable energy sources, like solar power, are used in engineering to power machines.

Materials Needed:

- Solar panel (small)
- Motor (small)
- Plastic or cardboard for the vehicle body
- Wheels (small)
- Axles (e.g., straws or skewers)
- Tape, glue, or hot glue gun
- Wires
- Scissors
- Ruler
- Strong light source (sunlight or lamp)

Safety Precautions:

- Handle scissors and glue carefully to avoid injury.
- Use a hot glue gun under teacher supervision.
- Ensure that the solar panel and motor connections are not mishandled to avoid electric shock or damage.

Steps:

1. **Design and Plan:**
    - Start by sketching the design for your solar-powered vehicle. Think about how the solar panel, motor, and wheels will be arranged on the vehicle body. How will they all fit together?
2. **Build the Vehicle:**
    - Using your materials, begin assembling the vehicle. Attach the wheels to the axles and then to the vehicle body. Ensure the wheels can rotate freely.
    - Attach the solar panel to the top of the vehicle. Make sure it is securely fastened.
    - Connect the wires from the solar panel to the motor to complete the circuit. Be careful to follow any instructions for wiring, as you want to ensure the current flows properly.
3. **Test the Vehicle:**
    - Place your solar-powered vehicle under a light source (either sunlight or a strong lamp) to simulate the sun's energy.
    - Watch how your vehicle moves. Does it go fast or slow? Does it move better in direct sunlight or under artificial light?
    - If your vehicle isn't working as expected, try adjusting the positioning of the solar panel or the motor. Test it again after each change.
4. **Modify and Improve:**

- Based on your observations, make changes to improve the performance of your vehicle. For example, adjust the wheel alignment or ensure the solar panel is getting maximum sunlight exposure.
- After making improvements, test the vehicle again to see if it moves better.

5. **Present Your Findings:**
   - After building and testing your solar-powered vehicle, present it to the class. Explain how solar energy powers your vehicle and how you made improvements to increase its efficiency.
   - Share any challenges you faced during the building process and how you solved them.

Cleanup:

- Dispose of any leftover materials like small pieces of cardboard or plastic in the recycling bin.
- Clean the workspace, and make sure no tools are left out. Return scissors, glue guns, and any other equipment to their proper places.

Additional Notes:

- This project can be modified for students with varying levels of ability. For example, students who may need more assistance can be paired with a peer for help with building the vehicle.
- Provide extra visual resources or demonstrations for students who need additional clarification on wiring or construction.