



Solar Car Challenge: Test Your Solution

Activity Summary

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DESCRIPTION: Students will play around with the solar car kits to familiarize themselves with the materials in preparation for the solar car engineering challenge.

GRADE LEVEL(S): 6, 7, 8

SUBJECT AREA(S): Physics, energy, electricity, solar, motion, engineering

ACTIVITY LENGTH: 50 minutes

LEARNING GOAL(S): To introduce students to the problem that this project will attempt to solve: building a solar car that will go straight, far, and fast to win a race.

STANDARDS MET:

Oregon:

- | | |
|----------|--|
| AST 11.1 | Student I can design a solution for a defined problem, identifying the design constraints. |
| AST 9.4 | Student can evaluate possible solutions to global climate change. |
| AST 7.1 | Student can compare and contrast renewable and non-renewable energy resources. |

Next Generation Science Standards:

- | | |
|-----------|--|
| MS-ESS3-3 | Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment. |
| MS-ETS1-1 | Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. |
| MS-ETS1-2 | Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. |

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- MS-ETS1-3 Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
- MS-ETS1-4 Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

OTHER MATERIALS LIST:

- Stop watch
 - Meter sticks and/or measuring tapes
 - Flood lamps or a sunny day outside with a smooth surface, with 50 meters marked off for the tests.
 - “Solar Car Challenge Engineering Challenge Packet,” “Test Your Solution” page
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Vocabulary:

- Chassis
- Friction
- Solar panel

Student Background:

- Students should have a basic understanding of electricity and how photovoltaic modules work
- Students should have had experience playing around with the solar cars. See preceding activities:
 - “Solar Car Challenge: Introduction of the Problem”
 - “Solar Car Challenge: Criteria, Constraints, Background”
 - “Solar Car Challenge: Background Research on Car Design”
 - “Solar Car Challenge: Team Brainstorm”
 - “Solar Car Challenge: Develop Your Solution”

Educator Background:

- It is helpful if teachers have a basic understanding of how photovoltaic modules work, the energy transformations at work:
 - Electromagnetic radiation (from the sun) to electrical energy (occurs in the photovoltaic module)
 - Electrical energy to motion (in the DC motor)

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Lesson Details:

Teaching Guide

Take students to the location that has been designated for the tests. Students will make test runs and measure their test run time in seconds. They should make 3-5 test runs. They should not make any revisions to their design while making the tests runs.

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