



Solar Car Challenge: Solutions Briefing

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 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:

- “Solution’s Briefing for Iteration #1” student handout in the “Solar Engineering Challenge Packet”
 - Overhead projector
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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”
 - “Solar Car Challenge: Test 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)

Lesson Details:

Teaching Guide

Have groups prepare a presentation answering the questions in the data table on the “Solutions Briefing for Iteration #1” handout in the engineering packet. Using the overhead, each team should show their design and explain each of the questions. Every person on each team needs to speak. Teams should take notes on each other’s presentation. When they go back to redesign their cars, they can use this information to help with their design plan.