Solar Car Challenge: Team Brainstorm

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.

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:

- "Diagram of My Solar Car Design Idea" student handout
- Sticky notes

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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"

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:

Divide students into engineering teams of three or four students. Team members will think of a design they would like to use to build a solar car. They will draw it in the box on the brainstorm handout. They will also label each of the parts and use arrows and centimeter markers to show the approximate sizes of each part.

When everyone in the group has drawn out their ideas, team members will share them one at a time. Team members will not discuss or evaluate any of the ideas presented but may ask questions for clarification so that they understand the idea better.

Pass out yellow stickies. Each group member should write evaluative feedback on the stickies about what they liked, didn't like, and what they thought would worked well or other types of feedback—at least one sticky per group member per diagram. Again, no discussion will occur during this process.

Give the diagrams back to each person. They need to record each of the ideas on their engineering outline. Now group members will have a chance to discuss the ideas and to choose one, combine some, or come up with something new.