



Subject Area(s) Science & technology

Associated Unit Engineering

Associated Lesson Solar Energy Lesson

Activity Title Solar Cars

Grade Level 6 (5-7)

Activity Dependency Solar Energy Lesson

Time Required Four 1 hour periods

Group Size (“Divide the class into teams of four or five students each.”)

Expendable Cost per Group US\$ 9.00

Summary

In this lesson students will act as their own development companies. They will create business plans which should detail how their company expects to design their cars, sell them , and make a profit. The students, after doing their lesson plans will them have them evaluated and then funded. At this point they will be able to design and build their solar cars. The solar cars will then be tested and evaluated.

Engineering Connection

Sunlight is an excellent energy source and the future of using solar power is very

exciting. The Sun's energy can be used to heat and cool buildings, generate electricity, operate communication and navigation systems and even power solar cars, like the ones in the General Motors Solar Car Sunrayce. All Solar powered cars get their fuel from the same place, the sun. Engineers still have many problems to overcome before solar energy becomes efficient enough to use large scale.

Keywords Solar power, renewable resource, solar cell

Educational Standards

- Science: • Science: A.1, A.2, E.8, F.3, F.4, F.5, G.1, G.3, E.2, E.1

Pre-Req Knowledge

Students should have limited knowledge of the scientific method, as well as solar energy.

Learning Objectives

After this activity, students should be able to:

- Describe the basic procedures engineers follow to solve problems
- Describe the basic principles of solar energy
- Describe the advantages and disadvantages of solar power

Materials List

Each group needs:

- 1 kelvin car set each group. \$9:00 from Kelin.com
- 1 multi meter

Introduction / Motivation

Engineers and scientists still have many questions and problems to tackle before solar power becomes an efficient and economical way to fuel vehicles. But as the demand on fossil fuel resources increases, research will continue to search for alternative energy sources, including harnessing the Sun's energy to drive a vehicle. The most exciting part of using solar power as an energy source is that it is pollution free and inexhaustible. Students will create their own solar car designs and try to make them as efficient as possible.

Vocabulary / Definitions

Solar - Referring to the Sun.

Solar Collector - An object that gathers the Sun's energy.

Nuclear Fusion - The process by which the Sun produces heat and light.

Fossil Fuels - Coal, oil and natural gas. Substances that have been formed by the decay of the remains of ancient plants and animals - in a sense they are a form of "buried sunshine."

Solar Panel - A device that captures the Sun's energy so it can be used for heating and other purpose.

Procedure

- Students will work out a business plan detailing why solar energy is a good investment in terms of powering their cars.
- After students finish their business plans, they should be evaluated in terms of completeness.
- Students should then be given a Kelvin car kit for them to put together.
- After the kits are put together, students should figure out the optimum angle for the solar panels so that they produce the most voltage.

- Students will then evaluate the cars in terms of performance (speed= $\text{distance}/\text{time}$)

Background

During the 1990s, regulations requiring an approach to "zero emissions" from vehicles increased interest in new battery technology. Battery systems that offer higher energy density became the subject of joint research by federal and auto industry scientists. Solar cars were first built by universities and manufacturers. The sun energy collector areas proved to be too large for consumer cars, however that is changing. Development continues on solar cell design and car power supply requirements such as heater or air-conditioning fans.

Teachers should be prepared to discuss solar energy in depth so that the students will get a good understanding of it.

Before the Activity

- Gather materials and make copies of the directions that comes with the kit.
- The teacher should set up a hot glue gun station so that it does not go everywhere, or students use it for alternative uses.

With the Students (suggested subheading)

1. Divide the class into groups of four or five students each.
2. Describe step-by-step procedures.

Safety Issues

A hot glue gun is needed for this lesson, this should be used by the teacher or teachers aid only.

Assessment

The teacher should have students write in their log books the lesson objectives from memory.

Post-Activity Assessment (suggested subheading)

After the lesson the students can make a connection between their solar cars and what is actually being done by scientists.

Redirect URL

www.kelvin.com

Owner

Rodney Johnson, Drexel University, GK 12

Contributors

Sue Slade