

5E Lesson Plan

Lesson Title: Solar Energy-Use it for Cooking!

Subject area / course / grade level: Sixth Grade Science

Lesson Length: This activity will take one week with 45 minutes for each lesson. The first day the stage will be set by developing a KWL chart and developing background knowledge. The teams of three students may start to design their ovens. Day two and three the students will create and test their ovens. Day four is test day for all of the ovens (if it is sunny). Day five the students can redesign and evaluate how their ovens worked.

Materials: Pizza Boxes and other similar boxes, Pringle cans, tape, scissors, construction paper, clear plastic wrap, aluminum foil, thermometers, science journal, pencil, ruler or wooden dowel

Lesson Overview: The students will examine solar energy. The students will design and create solar ovens.

Standards: Wisconsin Academic Science Standards

- C.8.6 State what they have learned from investigations, relating their inferences to scientific knowledge and to data they have collected.
- E.8.6 Describe through investigations the use of the earth's resources by humans in both past and current cultures, particularly how changes in the resources used for the past 100 years are the basis for efforts to conserve and recycle renewable and non-renewable resources

Background Information: Solar Energy

Solar energy is energy from the sun. The sun is a giant ball of hydrogen and helium gas. Radiant energy is emitted from the sun in all directions and some of it reaches Earth.

Solar energy is one of the cleanest, as well as the most inexhaustible energy sources. It is renewable. Sunlight can be used for heating homes and cooking. The challenge is to economically transform sunlight into usable heat.

Lesson objective(s):

- To demonstrate that radiant energy can be absorbed or reflected by objects.
- Some of the energy absorbed by objects is converted into heat.
- The students are to create a solar heating box.

ENGAGEMENT

- Hurricane Sandy has swept over the East Coast. Many people are without power.
- How can we capture the energy from the sun and use it to meet the needs of people without electricity?
- Create a group K-W-L chart on the white board listing all that the students know about solar energy and it's uses. Each student should also create an individual chart.

EXPLORATION

- We are going to have a contest. Many people do not have electricity to heat their food. It is your team's job to design a solar box. The solar box which reaches the highest temperature after thirty minutes is the winner.
- The teacher asks "Which items will absorb heat?" "What will reflect heat?" "What shape do you think would be the best design?"
- Show students the table with supplies.
- Give the students a recording sheet. Let them work as teams to create a solar box. They may redesign the box after testing it.
- On Thursday, if it is sunny, the entire class will test their boxes for the final time.

EXPLANATION

- The students will present their boxes to the class.
- The students explain how they created their solar boxes.
- The students will add to their KWL charts.

ELABORATION

- Discuss what the students have added to their charts. Add to the class KWL Chart.
- Ask the students, "What are some of the benefits of solar energy? Are there any drawbacks?"
- As you add to the KWL chart and discuss the solar ovens, emphasize the words radiant, absorb, renewable and solar energy. Add these words to the word wall .

EVALUATION

- The students will complete the evaluation questions at the end of the project.
- The solar box rubric will be completed.

RESOURCES

- Conway, Lorraine. (1985). *Energy*. Carthage, IL: Good Apple, Inc.

Web Sites

- <http://www.energyforeducators.org/scienceunits/energy.shtml> (Energy for Educators, Bringing Energy into the classroom)
- www1.eere.energy.gov/education/lessonplans/default.aspx (Energy Education and workforce Development)
- timberleafmpsd.sharpschool.com (Solar Oven Challenge)

Name _____

Hour _____

KWL Chart-Solar Energy

What do we Know?	What do we want to know?	What did we learn?

Name_____

Hour_____

The Solar Box

Design and create a solar box that can be used to heat food.

Materials we used:

Our Design:

Testing Our Solar Box

Beginning Temperature _____

Observations:

Time	Temperature

What would you do to improve your design? Explain why you would make these changes.

Evaluation Sheet

1. List the steps involved in making your solar box.
2. How would you change the design of your solar box to make it heat up faster or hotter?
3. What are the limitations of a solar box? Describe some ways to overcome these limitations.

Solar Box Rubric

Category	3	2	1
Collaboration	Participation by all members. Encouraged others.	Participation by most members.	One group member did most of the work.
Communication	Consistently shared ideas and listen to others. Used science vocabulary.	Sometimes shared ideas. Sometimes used science vocabulary.	Shared very few ideas. Rarely used science vocabulary.
Problem Solving	Uses materials correctly with minimal assistance.	Uses materials correctly with some assistance.	Used materials correctly with frequent assistance.
Function	Created a solar box that heated to a hot temperature.	Created a solar box that heated up a few degrees.	Created a solar box that did not heat.

Score _____/12