**Lesson Topic: Grade Level: Time:**

Solar Energy 3-5 30 minutes\*

\*Thermometers will be checked in 15 minute intervals throughout the day.

\*A sunny day will be needed to perform the extension.

**Objective:**

Students will be able to identify and explain that the sun gives off energy and this can be harnessed in order to create electricity.

**Teacher Background Information and Instructional Alternatives**

The following sites are recommended to use as the engagement or part of the explanation. If available some of the sites may take the place of parts of the teacher led discussions. Students could research the sites before hand or the site could be shown for the whole class if the equipment is available.

<http://www.nasa.gov/vision/universe/solarsystem/sun_for_kids_main.html>

This site explains why scientists study the sun and gives the top ten facts a person should know about the sun. It even touches on what the Earth would be like without the sun (which is suggested as part of the exploration).

<http://www.wonderville.ca/asset/solarenergydefenders>

This page has an interactive game in which students apply their knowledge on solar energy and save the students at the dance!

<http://www.solarforward.com/solarkids/solar_power.html>

A child introduces a slideshow about the sun and solar power. There are visuals and diagrams that introduce solar power with panels and solar cars.

**Materials Needed:**

2 thermometers for each group of students

1 piece of black construction paper for each group

1 piece of white construction paper for each group

Paper to record observations and temperatures

Brain File hand out for each student

**Engagement:**

-Post the following definition for students: “Energy is the ability to do work or create a change.”

-Ask, “Where to people, machines, etc. get their energy from?” Brainstorm a list of energy sources. Guide students to be sure that solar energy is included on the list. Students can do this in their notebooks or as a class discussion.

-Explain to the class that they will be learning about how the sun is able to give building energy. This is called solar power. Distribute the “brain file” and have students complete the “what I think I know” and “questions I have before” portion.

**Exploration:**

-Pose the following question: “What would the Earth be like without the sun?” Have students hold group discussions about life without the sun and how things would be changed. Share some of their ideas. Lead this conversation to identifying what the sun gives the earth: light form the sun allows us to see. The sun turns energy into heat, this is heat energy. The sun makes plants grow (photosynthesis). When talking about plants discuss how plants feed other living things. Even the meat we eat comes from those animals eating plants. The sun turns into heat when it collides with an object.

-This leads to 2 things: the sun gives the ability to work, and it provides a change which is the definition for “energy.”

**Explanation:**

-This discussion should focus back to how the sun’s rays turn into heat when it collides with an object. This process is displaying energy. The sun is the key factor in the water cycle because the sun’s heat provides energy to evaporate water from the Earth’s surface. The sun also creates wind- when the sun shines it heats the land more rapidly than water. The air over the land becomes warm and rises. The cooler air over the water moves where the warm air was. This moving air is wind!

-This energy is called solar energy because it is energy that the sun produces.

-What are some foods made by plants (bread, pasta, rice, vegetables, and fruit)? Plants get their energy from the sun, another example of solar energy.

What do you notice when you go outside on a sunny day? Does certain color clothes make you more or less hot? When the sun creates heat this is another example of solar energy.

-What happens when you go inside your car on a hot day? The car is hot because it is storing that heat energy.

-Ask students what other ways we can use solar energy, is it stored other ways? This discussion should lead into things that are solar powered as well as solar panels.

- A solar powered home uses solar panels to catch the energy from the sun and create electricity.

-Have you ever noticed the color of solar panels? Why are they dark?

-Solar panels face the south in order to take advantage of the winter son. It takes the energy from the sun and turns it into electricity.

-Solar panels are photovoltaic devices. Photo=light and volt= measure of electricity.

-These devices are made out of silicon. There is a small amount of chemicals added for a specific purpose. On the back side of the panel boron is added. Boron attracts electrons. This side of the panel is known as p-type. Any predictions about what p could stand for?

- The top side of the panel has phosphorus. Phosphorus is known to hold an excess amount of free electrons. This side is called the n-type. Any predictions about what n could stand for?

-Lead this discussion into what other things do we use that have a p side and an n side? A battery! A solar panel is like a large battery. The p-type and the n-type form an electric field. The circuit connects the sides. When the sun’s energy hits the panels electricity is formed.

**Extension:**

-Students will be divided into groups of 4-5. They will create two pockets out of construction paper (one black and one white). Place the thermometers in the pockets so that they are completely enveloped by the paper. Put the pockets outside or in a sunny area. Make predictions about which pocket will attract the most heat and why this will happen. Check thermometers every 15 minutes and record predictions.

**Evaluation:**

Have the students respond to one or more of the following prompts in a science journal or on lined paper:

-Have students complete their brain file. You may want to share some of your misconceptions for the students.

-Prove that sun gives us energy. Describe how the sun gives the ability to do work or causes a change.

-Explain what the Earth would be like without the sun using specific details about how the sun produces energy in your explanation.

-Create a diagram that displays how the sun gives energy.

-Explain how a solar panel creates electricity. Use details about what you know about the sun’s energy to explain this.