

Lesson Plan: Comparing Energy Sources

Subject Area: Science

Grade Level: 5th

1. What do I want my students to learn?

Students will observe how energy is converted from one form to another and compare solar energy to traditional heating methods.

2. What standards will be met?

Support Conclusions

Identify the source of solar energy

List 2 major advantages and disadvantages of using solar energy

Identify the source of heat and light from the sun.

3. What is my goal?

Students will use predicting, measuring, observing, inferring, communicating, and hypothesizing skills as they conduct this activity. They will learn how to use temperature probes and their handheld to record and graph data.

4. How will I assess the learning that took place?

I will use a rubric to assess how well students are participating in their groups to complete this activity. I will also use their completed activity journal to assess individual understanding.

5. How will I know when the desired learning has taken place?

Students will complete the activity in cooperative groups and complete their activity journal individually. We will also discuss conclusions in a whole class setting.

6. How will the lesson be taught?

-instructional approaches/strategies to engage students

Teacher

a. The teacher will demonstrate and explain how the temperature probe works with the handheld.

b. The teacher will have all supplies needed for the activity ready.

c. The teacher will give directions for the activity.

d. The teacher will have covered the necessary material previously in class that is needed to understand the activity.

Individual

a. Students will create a solar energy collector following written directions. They will do this in cooperative groups.

b. Students will record temperatures throughout the activity.

c. Students will use many process skills to complete the activity and their individual activity journal.

Whole Class

a. Questions prior knowledge before the activity.

b. Check for understanding after the activity.

Team

- a. The team is the cooperative group.
- b. They will complete the activity using their handhelds and the temperature probes.
- c. They will record and graph data in Excel or Quicksheet.
- d. They will take notes using memo pad on their handheld.

7. What material and/or equipment including software will be necessary

- | | |
|---|------------------------|
| a. Handhelds | j. Clay |
| b. Imagiprobe | k. Masking tapePushpin |
| c. Temperature probe | l. Scissors |
| d. Excel Software or Quicksheet | m. Two 250 ml beakers |
| e. Activity sheets and activity journal | n. Clear Plastic wrap |
| f. Shoe box | o. Hot Plate |
| g. Newspaper | p. Funnel |
| h. Black Plastic | q. Rubber hose |
| i. Two Straws | |

Procedure

1. Select the appropriate tools to make a solar energy collector. Line the shoe box with crumpled newspaper and cover with black plastic.
2. Plug one end of a straw with clay. With the pushpin, punch 12 holes in one side of the straw.
3. Attach the rubber hose on the straw's open end. Tape the straw in place at the top of the box. Attach the other end of the hose to the end of the funnel. Cover the box with clear plastic.
4. Cut the other straw to make a drainage pipe. Make a hole at the base of the box and insert the straw into it. Seal the area around the straw with clay and masking tape.
5. Predict whether the solar collector a burner would heat water more quickly.
6. Place a beaker under the drainpipe. Measure and record the starting temperature with imagiprobe temperature sensor. Repeat this process three times using the same water.
7. Measure 250 ml.of water into a beaker. Observe the teacher heat the water over the hot plate.
8. Record the time at which the temperature of the water equals that heated by the solar collector.

Conclusions

1. Compare your prediction with your observations.
2. Infer what caused the temperature of the water to increase in the solar collector.
3. Infer what caused the temperature of the water to increase on the hot plate.

Questions to Ask:

Beginning:

Will the solar collector or the burner heat the water more quickly?

During:

Use the rubric to assess the group as they proceed through the activity.

After:

Compare the predictions with the findings.

Did you predict whether the hot plate or solar collector would heat water more quickly?

Did you observe the temperature of the water?

Did you record your observations?

Activity Journal

Comparing Energy Sources

Record your observations in the chart.

Test	Starting Temperature	Time	Ending Temperature
1			
2			
3			

How long did it take to heat the water on the hot plate to the same temperature as the water in the solar heater?

Conclusions

1. Compare your predictions with your observations.
2. Infer what caused the temperature of the water to increase in the solar collector.
3. Infer what caused the temperature of the water to increase on the hot plate.

Asking New Questions

1. Develop a testable question. Plan and conduct a simple investigation based on this question and write instructions that others can follow to carry out the procedure.
2. Prepare a report of your investigation that includes the tests conducted, data collected, or evidence examined and the conclusions drawn.
3. Identify a single independent variable in the investigation and explain what will be learned by collecting data on this variable.

Assessment

Name _____

Date _____

Score _____

Comparing Energy Sources

Scoring Criteria	
Follows procedure	
Records all data	
Concludes that there is a difference in how each heat source works.	
Concludes how each energy source heated the water and which source is preferred.	
Correctly answers conclusion questions.	
Total Score	