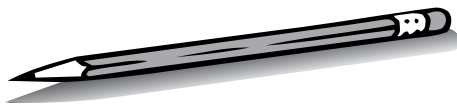


Investigating Energy Sources and Use

WHAT YOU NEED



pencil

Find Out

Do this activity to see how you and your community depend on energy sources.

Process Skills

Communicating
Inferring
Observing
Using Numbers
Interpreting Data

Time

- 5–10 minutes each day for two weeks
- 30 minutes on the last day of the second week

WHAT TO DO

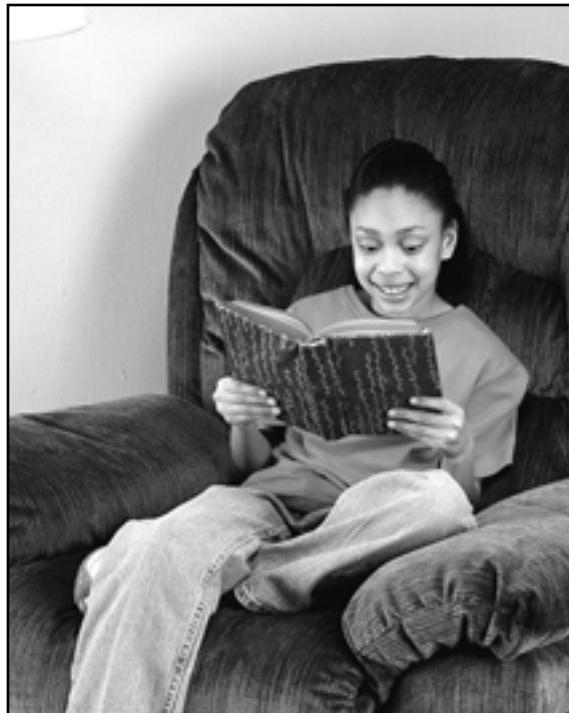


1. Each evening for two weeks, think of what you did that day. **Record** seven things you used during the day that require energy.
2. Determine and **record** the energy source for those seven things, such as gas or electricity for your stove, electricity from outlets in your home, or batteries.
3. Estimate and **record** the time you spent using each device.

4. Find the electric meter at your home. Electric meters keep track of the kilowatt hours of electricity consumed in your household. **Record** the numbers that appear on the meter.

5. After two weeks, **record** the numbers again. **Subtract** the first number you recorded from the second. This number is how many kilowatt hours your household used in the two-week time period. **Record** the calculation.

Students will need a second copy of the recording chart on p. 95.



Things You Use That Require Energy

Week _____

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Energy Source	Answers in the chart will vary according to the students' activities.						
Time Spent							
Energy Source							
Time Spent							
Energy Source							
Time Spent							
Energy Source							
Time Spent							
Energy Source							
Time Spent							
Energy Source							
Time Spent							
Energy Source							
Time Spent							

Energy Use for Your Household in Two Weeks

Beginning Reading	End Reading	Total Kilowatt Hours Used (End Reading – Beginning Reading)
Answers will vary.		

Conclusions

1. Could you have done any of the activities without using gas, electricity, or batteries? If so, tell how, and what your source of power would be.

Answers will vary, but could include reading by candlelight or during the day, cooking by campfire, walking instead of using a car.

2. **Calculate** the total time you spent doing each activity for the two weeks.

Answers will vary.

How many activities could be done using a different source of energy?

Answers will vary but could include activities that use solar power, horse power, or wind power as a source of energy.

3. How many kilowatt hours of electricity did your household use in two weeks? Based on this number, calculate how many kilowatt hours you would use in a month by **multiplying** the two-week total by 2.

Answers will vary.

New Questions

1. What would be the greatest change in your life if you lived without electricity?

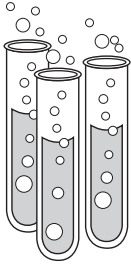
Answers will vary.

2. Find out the population of your city or community. If everyone used the same amount of kilowatt hours as your household, **calculate** how many kilowatt hours were used by your community in two weeks by **multiplying** the two-week total by the population.

Answers will vary.



Name _____



ACTIVITY

Investigating Kinetic and Potential Energy

Record your observations in the following chart.
Answers will vary on the basis of materials and quantities used.

	Empty Can	Can with Sand
Mass		
Height of ramp		
Distance rolled		

Predict which of the coffee cans will roll farther and why.
Predictions will vary.

Make a **hypothesis** telling what will make the coffee cans roll farther and why. Describe what materials you will use and how.
Hypotheses will vary.

Record your observations in the following chart.
Answers will vary on the basis of materials and quantities used.

	Empty Can	Can with Sand
Height of ramp		
Distance rolled		
Spaces in chart are for other student variables.		

Name _____

Conclusions

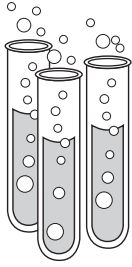
- ① Which can had more potential energy at the top of the ramp? Why?
The can with sand, because it has a greater mass.

- ② What type of energy did the can have at the bottom of the ramp?
kinetic

- ③ Describe how the height of the ramp and mass of the cans affected the amount of potential and kinetic energy of the cans.
The higher the ramp, the greater the potential and kinetic energy the cans would have. The greater the mass, the greater the potential energy and kinetic energy the cans would have.

Asking New Questions

- ① What variables did you adjust according to your hypothesis?
Answers may vary but may include the height of the ramp, the amount of sand in the can, or other variables that the student altered in Step 6.
- ② What variables in the activity remained the same, or were constant?
Answers may vary but may include the size and shape of the cans.



Name _____

ACTIVITY

Investigating Steam and Work

Predict what will happen to the pinwheel when the flask is placed on the hot plate.

As the water heats, it turns to steam and the pinwheel turns.

What did you **observe** when the flask was placed on the hot plate and the water boiled?

The pinwheel turned.

Name _____

Conclusions

1 Compare your prediction with your observation.
Answers will vary on the basis of the prediction made. Students should have observed that the pinwheel moved.

2 **Infer** what caused the pinwheel to move.
The thermal energy of the steam was converted to mechanical energy when the pinwheel blades moved.

3 Describe how energy was converted in this activity.
The electrical energy of the hot plate was converted to thermal energy. The thermal energy was converted into mechanical energy, which moved the blades of the pinwheel.

Asking New Questions

1 Would this activity have been different if cold water had been used? Why?
Yes. No steam would have been produced and, thus, no work would have been done.

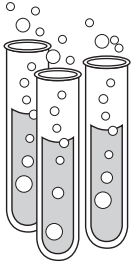
2 How is the simple engine you made like or unlike the steam engines you studied in this lesson?
Answers will vary. This engine used steam to do work by converting thermal to mechanical energy much like the other steam engines studied.

3 After doing this activity, how would you define a simple engine?
Answers will vary and should reflect an understanding of energy conversion and work.

Activity Journal

Lesson 3 • Alternative Energy

Name _____



ACTIVITY

Comparing Energy Sources

Record your observations in the chart.

Answers will vary.

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?

Answers will vary.

Conclusions

- 1** Compare your predictions with your observations.
Answers will vary on the basis of the prediction.

- 2** **Infer** what caused the temperature of the water to increase in the solar collector.
Answers may include that the solar, or radiant, energy from the sun was converted to thermal energy when striking the black plastic. The thermal energy of the plastic transferred to the water and heated it.

- 3** **Infer** what caused the temperature of the water to increase on the hot plate.
Answers may vary and include that electrical energy is converted to thermal energy on the hot plate. Thermal energy was transferred to the glass, then to the water.

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.
Student-developed questions and investigations will vary.
- 2** Prepare a report of your investigation that includes the tests conducted, data collected, or evidence examined, and the conclusions drawn.
Reports will vary but should be well organized and clearly written.
- 3** Identify a single independent variable in the investigation and explain what will be learned by collecting data on this variable.
Variables and explanations will vary according to students' investigations.