



## Energy – It's In The Bag

Understanding Potential and Kinetic Energy  
Time – approximately 1 class period

*Adapted from Fossils to Fuel— An Elementary Earth Science Curriculum, developed for the Oklahoma Energy Resources Board, an agency of the State of Oklahoma.*

**GRADE LEVEL:** K-6

**SUBJECT:** Science, Math

### WONDER WHY . . .

Have you ever wondered where you get the energy to live and play? What things in your life require energy? Where do you think energy comes from?

### CONCEPT

Energy is the ability to cause force and motion on an object. All things use a source of fuel to produce energy. Potential energy is stored energy, such as a parked car. Kinetic energy is energy in motion, such as a moving car.

### CORRELATIONS TO CCSS AND ARKANSAS FRAMEWORKS:

<http://www.arkansasenergyrocks.com/educators/activities/Energy-Its-In-The-Bag-Correlations.pdf>

### TEACHER INFORMATION

Scientists define energy as the ability to do work. Work is created by force and motion on an object. Fuel is also necessary for work to be done. Fuel can be food for our bodies, gasoline for our cars, or electricity for our home.

Energy is required for everything we do whether we are working or playing. Children may associate work with mowing the lawn, doing homework, or the place adults go to earn a living. When we are talking about energy in scientific terms, it is necessary to think about the idea of “work” in a new way.

It is also important to think about the fuel that creates that energy. When we use fossil fuels, we are releasing the energy that first came to earth from the sun millions of years ago.

Additional sources of information:

<http://www.wou.edu/las/physci/GS361/EnergyBasics/EnergyBasics.htm>  
<http://www.physicsclassroom.com/Class/energy/u5l1c.cfm>



## MATERIALS

- Paper bags to assemble “Energy Bags” containing the following items: (one per group)
  - 2 rubber bands
  - 1 small rubber ball
  - 2 paper clips
  - 2 magnets
  - 1 toy car
  - 3 gears
  - 1 pop-up toy
  - 1 ruler (with center groove)
- **Student Handout 1 and 2**
- Light bulb
- Battery
- Wire
- Small pieces of candy or dried fruit

## DISCOVERY PROCEDURE

1. Arrange students into cooperative groups then give an “Energy Bag” to each group. Ask students to examine the objects in the closed bag. Do you see potential energy?
2. Encourage students to work with combinations of items in their bag and experiment with ways of making the objects “go, run or cause something to happen.” They can refer to these as their “energy machines.”
3. Which objects in the bag have potential (stored) and/or kinetic (moving) energy? Record or draw the energy motions found in each object.

*Potential: ruler, paper clip, parked car*

*Kinetic: bouncing ball, moving gear, moving car*

4. Assemble the objects in the bag to design a **system** to cause movement.
5. Record or draw the energy motions found in the **system**.
6. Ask each group to present their “system.” Share how it moved and explain the kinetic and potential component.
7. Using small pieces of candy or dried fruit, a battery, a bulb and wire, lead a discussion about other energy sources. Ask students to explain the sources. (*Examples: sound, electrical, thermal, chemical and gravitational energy*) Refer to the following web site for an excellent explanation.

<http://www.eschooltoday.com/energy/kinds-of-energy/all-about-energy.html>



## CONCEPT FORMATION

1. Pose open-ended questions such as: Why do you think this is called a bag of energy? What makes energy?
2. Do you think the energy in the bag is potential (stored) or kinetic (moving)?  
*Possible answer: It is potential and kinetic.*
3. Which objects in the bag have potential (stored) and/or kinetic (moving) energy?  
*(Possible answer: Potential: ruler, paper clip, parked car  
Kinetic: bouncing ball, moving gear, moving car)*
4. Discuss questions in small groups and share findings. Encourage each group to formulate its own discovery definition of energy as it applies to motion of objects in the "energy bag." Share and discuss definitions with the class.
5. Have each student form his/her own definition of energy and record in their journals.
6. What do all of the definitions have in common? How are they different? Create a class definition for energy to focus on the idea that energy is the ability to make things go, run and happen.

## VOCABULARY

**Energy**—the ability to do work

**Potential**—stored energy

**Kinetic**—energy in motion

**Work**— move or cause to move gradually or with difficulty into another position

## ENRICHMENT

- Where does the television or computer get its energy?
- Compare your body to a working machine. Where does it get its energy? Demonstrate your body's ability to use potential and kinetic energy.



- Trace the flow of energy from the child riding a bike back to the energy of the sun (See graphics at the end of this lesson: Riding Bike ... Child's Energy ... Food ... Plants ... Sun). Where do you get your energy?
- Use a magnifying lens to concentrate the sun's energy on a small plastic container filled with water. Measure the temperature increase in degrees Celsius to demonstrate the transfer of the sun's energy.
- Act out various scenarios to determine if work is being done. Stretch a rubber band around your two index fingers. Ask students if work is being done. (*Yes, you are using fuel as provided by the food you eat.*) Place the rubber band on the table. Ask students if work is being done. (Ask students to give other examples.)

**STUDENT HANDOUTS** – (See separate files for editable Word Documents; teacher's answer keys follow.)



Name \_\_\_\_\_ Date \_\_\_\_\_

## Energy—It's In The Bag Student Handout 1-TEACHER KEY

### WONDER WHY . . .

Have you ever wondered where you get the energy to live and play? What things in your life require energy? Where do you think energy comes from?

### MATERIALS

- Energy – It's In The Bag Student Sheet (one copy per student)
- Energy – It's In The Bag Conclusion Student Sheet (one copy per student)
- "Energy Bags" containing the following items:
  - 2 rubber bands
  - 1 small rubber ball
  - 2 paper clips
  - 2 magnets
  - 1 toy car
  - 3 gears
  - 1 pop-up toy
  - 1 ruler (with center groove)

### PROCEDURE

1. Examine the objects in your "energy bag."
3. Use the materials in your bag and experiment with ways of making the objects go, run or cause something to happen.
4. Which objects in the bag have potential (stored) energy?  
(Possible answer: Ruler, paper clip and parked car)
5. Once an initial force is applied, which of the objects in the bag have kinetic (motion) energy?  
(Possible answer: Bouncing ball, moving gear and moving car)
5. Record or draw the energy motions found in each object.  
(Answers will vary.)
6. Formulate your own definition of energy as it applies to motions of objects in the "energy bag."  
(Answers will vary.)



7. Record the class definition of energy.

*(Answer will vary.)*

8. Assemble the objects in your bag to design a system to cause movement.

### **JOURNAL**

Write a brief description of your system of movement.

*(Answers will vary.)*

### **VOCABULARY**

Energy: *(Possible answer: the ability to do work)*

Potential: *(Possible answer: stored energy)*

Kinetic: *(Possible answer: energy in motion)*

Work: *(Possible answer: move or cause to move gradually or with difficulty into another position)*



Name \_\_\_\_\_ Date \_\_\_\_\_

**Energy—It's In The Bag**  
**Conclusion –Student Handout 2**  
**Teacher Key**

1. List six sources of energy.  
*(Possible answers: Oil, Sun (Solar), Wind, Natural Gas, Water (hydroelectric), and Coal)*
  
2. Where does the TV or computer get its energy?  
*(Possible answer: TVs and computers get energy from electricity. This is electrical energy created at a power plant.)*
  
3. Where does your body get its energy?  
*(Possible answer: Your body gets energy from the food you eat.)*
  
4. How are these two energy sources different?  
*(Possible answer: Energy from the sun provides light energy during the day that is needed by plants. This stored energy in plants, or energy waiting to happen, is called potential energy. Electrical energy is a flow of electrons (kinetic energy) which can be generated by the burning of fossil fuels.)*
  
5. How are these two energy sources similar?  
*(Possible answer: They both have the ability to change or move matter. Without energy there would be no light, no heat, no motion, and life would not exist. We get our energy from food and appliances in our home need energy to do work. Potential energy can be changed to kinetic.)*









