

Workshop 3

Transfer and Conversion of Energy

There are several kinds of energy, for example: motion, heat, light, electricity, and sound, as well as various forms of potential energy, including gravitational, elastic, and chemical. These kinds of energy can be converted from one to another, which is demonstrated in a classroom activity in which students test solar powered cars.

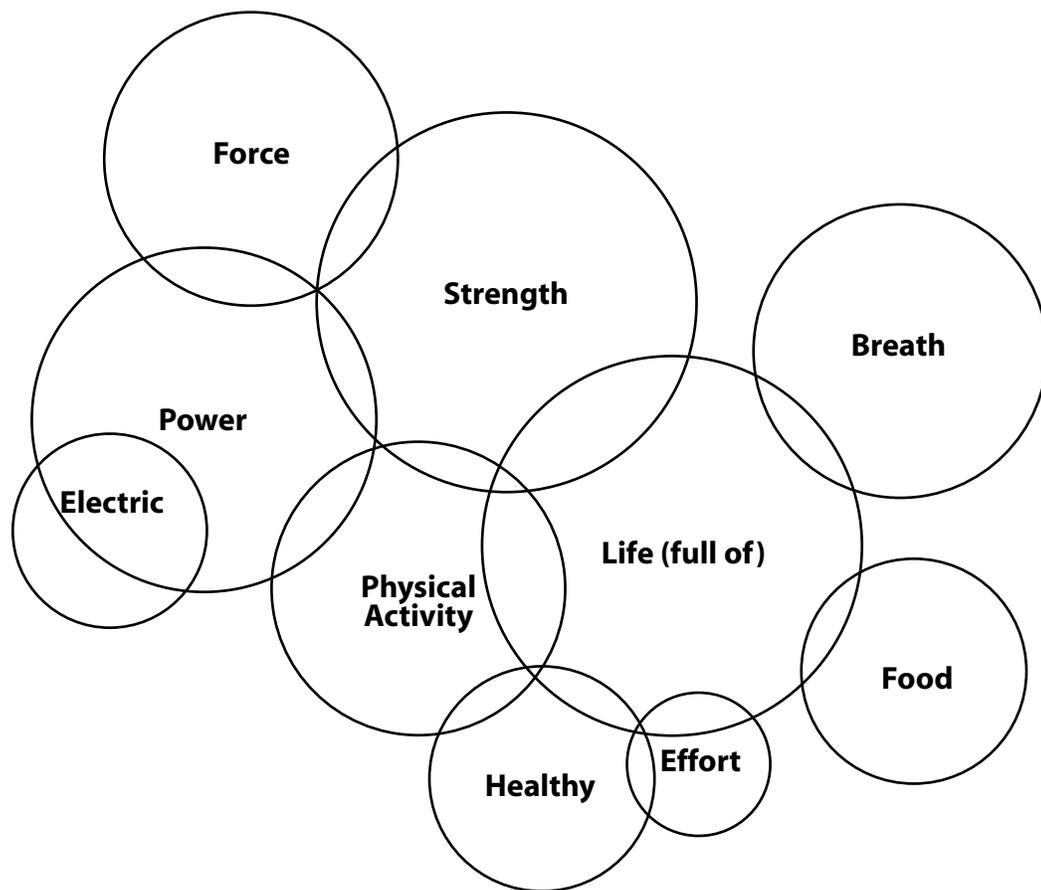
The program explores the principle of *conservation of energy*, which holds that when change happens in the physical world, so that energy is transferred or converted, the total quantity of energy remains constant throughout the process, even if the systems under study change considerably. Through a variety of analogies, different kinds of energy are shown to be equivalent. The second half of the program discusses energy “triggers”—events in which the application of a small amount of energy releases a much larger amount of stored potential energy. Classroom activities and interviews with children and scientists show this concept in action.

On-Site Activities

Getting Ready (30 minutes)

Children's Ideas

Your homework was to read "Children's Ideas on Energy," the third chapter from Joan Solomon's book, *Getting To Know About Energy*, and to be ready to discuss ideas about energy that your students have expressed in class. With a partner, categorize those ideas in the chart below and discuss your findings.



Forms of Energy

Energy can come in many different forms and from a variety of sources. In this workshop, we will categorize energy into several different forms that can be transformed from one to another.

1. Based on what you know about energy from everyday life, see if you can come up with several forms of energy. Be sure to note that we are looking for *forms* of energy, not *sources* of energy.
2. Once you have your list created, discuss it with two or three partners and see if you can agree on a list of energy forms.
3. Share your list with the entire group.

On-Site Activities, cont'd.

Watch the Video (60 minutes)

As you watch the video, consider the following questions and answers:

1. What are some of the forms that energy can take? ***Kinetic, Electromagnetic Radiation, Heat, Electrical Sound, Potential, Nuclear***
2. What happens when energy is converted from one form to another? ***When we convert energy to a different form, the total amount of energy before and after is the same.***
3. How can an object or system gain or lose energy? ***Objects gain or lose energy by transferring energy to or from other objects or systems.***
4. How can energy be stored and then released at a later time? ***Energy can be stored by converting it into some form of potential energy, and it can be released by a small amount of additional energy.***

Going Further (30 minutes)

Energy Transformations

We can trace the path of energy as it changes from one form to another. For example, when you turn on a light, electrical energy is transformed into light and heat.

1. Listed below are some common activities. With a partner, discuss the energy transformations that occur in each of the following activities.

You turn on a flashlight

You strike a match

You hit a nail with a hammer

You ride a bicycle

You turn on a radio

You shoot an arrow with a bow

2. What kind of object would undergo the following energy transformation?

chemical to electrical to mechanical

mechanical to heat

chemical to light and sound

mechanical to sound and electricity

3. Think of a complicated device that transforms energy from one kind to another. Describe your device and list the energy transformations that occur. Try to include at least three or four transformations.

For Next Time

Homework Assignment

1. Describe an energy transformation that occurs in real life:
 - a. over the course of one day.
 - b. over 100 years.
 - c. over thousands of years.
2. Find a toy (or toys) that you can bring with you to the next workshop session and be prepared to describe the energy transformations that occur when you use the toy(s).

Materials Needed for Next Time

Bring the toys described above to class.