



Environmental Character Education

Curriculum Resources



Responsibility

High School - October, 2006

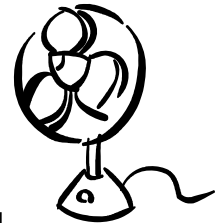
Dear Teacher:

This year, the state of Florida Legislature passed a new energy bill promoting energy efficiency, energy conservation, and alternative energy. We all need to make responsible decisions, especially when it pertains to our environment. One way to do so is to be conscious of how much energy we are using and how we can improve on the amount of energy we consume. October's character trait is responsibility; the following activities and information illustrate how environmental responsibility can save us money, energy and the environment. The curriculum resources and materials provided include the applicable numbering system for the *Sunshine State Standards*.

Energy Efficiency:

Sunshine State Standards: SC.B.1.4

When energy changes forms, the total amount of energy is conserved. However, the amount of useful energy is almost always less than the total amount of energy. For example, consider the energy used by an electric fan. The amount of electrical energy used is greater than the kinetic energy of the moving fan blades. Because energy is always conserved, some of the electric energy flowing into the fan's motor is obviously changed into unusable forms.



The fan converts a significant portion of the electrical energy into the kinetic energy of the fan blades. At the same time, some electrical energy changes into heat in the fan's motor. If the fan shakes, some of the electrical energy is being turned into unwanted kinetic energy. However, the more efficiently the fan uses electrical energy, the more energy will be transformed into kinetic energy that moves the air.

Energy Efficiency is a measurement of usable energy after energy is converted. You may be familiar with energy-efficient household appliances. These appliances convert a greater percentage of energy into the desired form than inefficient appliances. The more energy efficient a fan is, the more electrical energy it turns into actually moving the fan blades. Less electrical energy is needed to operate appliances that are energy efficient.

Conserving energy and using available renewable energy are two ways to make responsible, energy efficient choices. By reducing the amount of energy we waste and by using energy that comes from renewable, clean sources, we can reduce pollution and help maintain healthy ecosystems.

Source: McDougel Littell, *Science*

October 5-11 is Florida Energy Efficiency Week!

!! Attention Teachers !! ~ Tax-free shopping on Energy Efficient home appliances and products under \$1,500 during Energy Efficiency Week!

Find out more information by visiting the web site at www.broward.org/air/energyefficiency.htm

Responsibility

High School - October, 2006

Water that is elevated has more gravitational potential energy than water at a lower level. As water flows from a higher level to a lower level, its potential energy changes to kinetic energy. The kinetic energy of the moving water can be made to turn a bladed wheel to produce mechanical energy. The shaft of the bladed wheel is usually attached through gears to other mechanical devices such as electric generators. In the past mechanical energy from water wheels was used to grind grain and saw timber. Today, moving water is used primarily to generate electricity.

Power plants are built at the foot of high dams. Powerful jets of falling water shoot through pipes from the reservoir behind the dam. The water hits the blades of dozens of specialized water wheels called turbines, making them turn hundreds of times per minute. These turbines then turn electric generators that produce clean, efficient, renewable energy.

Materials

- Aluminum foil pie plate; Piece of string about 45 cm long; Scissors; Pencil; Tape; Eraser; Nut, bolt, or other small weight; Source of running water

Procedure

1. Cut out the circular bottom of an aluminum foil pie plate. Make eight equally spaced cuts toward the center of the foil circle. End each cut about 2 cm from the center.
2. Use a ruler to fold one edge of each section of the plate (solid lines in illustration) to make small ledges.
3. Punch a hole in the center of the plate and push a pencil through it. The pencil should fit snugly in the hole. Secure the pencil to the wheel with tape.
4. Hold the wheel under a slow stream of water such as a faucet. Position the wheel so the water hits the blades. Let the ends of the pencil rest lightly between your thumbs and index fingers. The wheel should wind the string onto the pencil, lifting the weight.
5. Vary the speed of the water flowing over the water wheel and observe.
6. Vary the amount of weight attached to the pencil and repeat experiment.

Observations

What happens to the wheel when the water flows quickly? What happens when the rate of flow is reduced? What happens when the weight attached to the pencil is increased? Discuss three things that affect the amount of weight that can be lifted (i.e., the amount of work done) by the water wheel.

Conclusion

How does this model serve as a model for electric generation through hydropower? How could the model be improved? What energy transformations occurred in this demonstration?

Application

Once built, hydropower plants have low maintenance and operational costs compared to other types of power production. So why is such a small amount of hydropower used to generate electricity in some states?

The world's largest dam, Three Gorges Dam, is under construction in China. The proposed completion date is 2009. The dam will create a 350-mile reservoir and save millions of people from the constant threat of flooding. However, there are problems in relocating the 1.2 million people that live in the area. Give two challenges involved in relocating 1.2 million people. Give two environmental problems that flooding a 350-mile area and establishing a reservoir may cause.

In the early 1930s President Franklin D. Roosevelt needed innovative solutions to lift the nation out of the depths of the Great Depression. The Tennessee Valley Authority (TVA) was one of his solutions. By 1942 the TVA had 12 hydroelectric projects under construction, had become the nation's largest electricity supplier, and had employed thousands of workers. TVA dams harnessed rivers, protected the surrounding areas from flooding, improved navigation, made farms more productive, supplied fresh water and drew industries into areas where electricity was provided by the dams. Today there is an outcry among environmentalists in some communities to remove dams. Considering this success story, what environmental and economic reasons can you give for dam removal? Source: www.rrc.state.tx.us/divisions/afred/education/lessons.html



October is International Walk To School Month! Look for Walk to School Activities on October 4th or during the entire month, or sponsor your own event! Visit www.iwalktoschool.org.

If you have any questions regarding these activities or have any comments, call 954-519-1220 or e-mail airoutreach@broward.org. You can also visit our web site at www.broward.org/kids/environment.htm.