

Lesson 1 - Teacher's Guide

"Conserve in Your Classroom" Mural

Lesson Summary:

This mural activity is a great way to discuss energy use and conservation in your own classroom. Each puzzle piece features several items that relate directly or indirectly to energy use.

Putting it Together:

Assemble the 21 pages enclosed to make a mural (5 feet wide by 3 feet tall). The finished mural should match the master page below. Each puzzle piece has been numbered for your reference.

Using the Mural as a Teaching Aid:

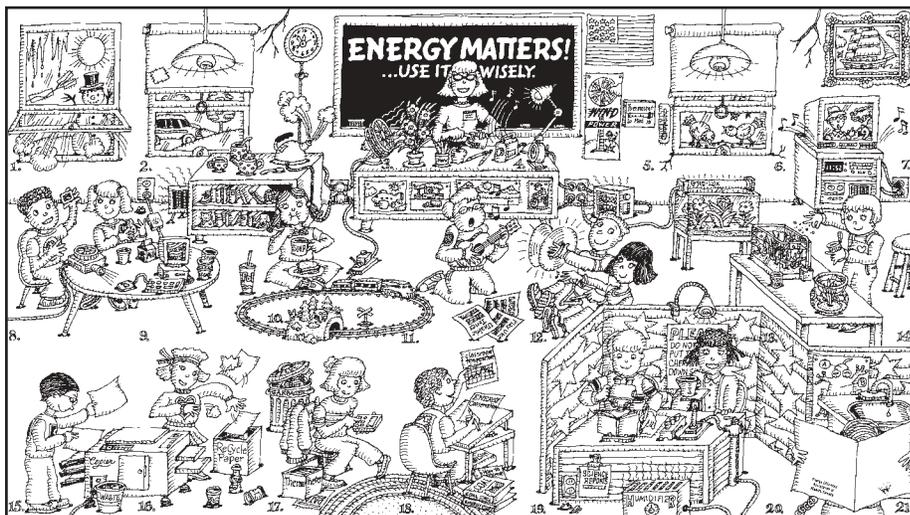
Option 1. Assemble the puzzle pieces and use the mural as a teaching center. Some key activities for your students might be:

- Describe the various ways electricity is being used in the mural.
- Describe how heat energy is being supplied and used in the mural.
- Tell how energy is being used in your own classroom—and how it could be used more wisely.

Option 2. Use a portion of the mural as a teaching aid. Make five copies of puzzle pieces 3, 4, 5, 10, 11 and 12, and distribute them to teams of six students. Have each team assemble their portion of the mural, tape it together, and respond to the activities described above in Option 1. Later, add the sections from the other teams to complete the mural, discussing each addition as it's added.

Option 3. Give each student one puzzle piece to study, color and describe to the class. Then, as a group, review how energy is being used in each piece. (The following page-by-page descriptions should help.)

Option 4. Ask students to mark in red all the ways that energy is being wasted in the finished mural. Follow this with a discussion of energy-saving solutions.

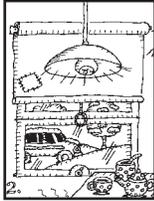


Energy Features for Students to Consider:



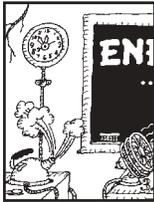
Puzzle piece #1, Window with Sun

- The sun is the ultimate source of the earth's energy supply, providing heat and light to the room.
- Open windows in the winter waste energy.
- Cracked glass causes air leakage.
- Icicles may indicate a poor insulation.



Puzzle piece #2, Window with Car

- Incandescent lights are not as efficient as Compact Fluorescent Lights (CFL's). A CFL uses $\frac{1}{4}$ the power and lasts much longer than an incandescent for an equal amount of lumens.
- On a sunny day, raise the blinds and turn off the lights to save energy.
- Cars consume gasoline, a non-renewable energy.
- Sugar contains food energy that originally came from the sun.



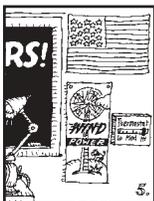
Puzzle piece #3, Electric Teakettle and Fan

- Clocks use electricity, although only a very small amount.
- An electric kettle uses a relatively large amount of electrical energy, so it should be turned off when the water boils.
- A fan should not be needed in a classroom in winter if the room temperature is set properly.
- A crack in the wall allows air leaks.



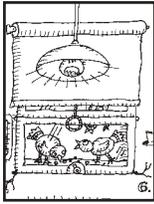
Puzzle piece #4, Teacher at Desk

- The radio requires electrical energy, although only a small amount. (It gives off sound energy and heat.)
- Plants need light energy to survive and grow.
- The apple provides food energy to the teacher.
- An electric pencil sharpener may be a waste of electricity and pencils, although it uses very little energy for its operation.



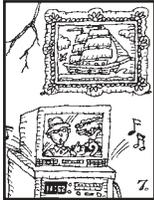
Puzzle piece #5, Thermostat and Flag

- A manual clock stores energy in a spring when wound.
- A desk lamp uses electric energy and is useful for lighting a small area of the room. Compact Fluorescent Lights (CFL's) use $\frac{1}{4}$ the amount of energy of an equivalent incandescent light bulb.
- A thermostat is very important as a regulator of temperature in a room and should be adjusted carefully to reduce wasted heat energy.
- The poster illustrates wind power, an alternative source of energy that is renewable.



Puzzle piece #6, Window with Birds

- Incandescent lights are not as energy-efficient as Compact Fluorescent Lights (CFL's).
- A thermometer can help monitor a room's temperature but should be hung away from cold walls and windows.
- The crack in the wall should be sealed.
- Windows should have weather-stripping.
- Windows should be at least double-glazed (two layers of glass) to help reduce heat loss.
- Birds require food energy for survival, which they can get from seeds.



Puzzle piece #7, TV and Picture

- The wall picture illustrates the historically important use of wind power as an energy source.
- The electronic equipment shows a TV monitor left on and not being used, which wastes energy.
- The digital clock is a very minor user of energy but seems unnecessary if there are other clocks in the room.
- The crack in the wall is a potential source of a cold draft that would waste room heat.
- Sound energy is being released.



Puzzle piece #8, Boy, Girl and Projector

- Electrical energy is being used by the projector to sort slides. Energy is wasted if the projector light is left on during sorting.
- The projector probably has a built-in fan that also uses energy.
- The sandwich and drink contain food energy.



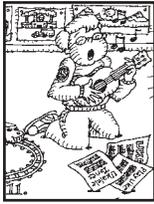
Puzzle piece #9, Computer and Books

- The wall outlet is a connector for appliances and equipment requiring electricity.
- Outlets can leak cold air into a room. Special plugs are used to seal the holes when outlets are not being used.
- The heat register is the adjustable warm air vent that brings heated air from the school furnace room into the classroom.
- The bookshelf should not be placed so that it restricts the flow of air from the heat register.
- The computer is another user of electricity and should not be left on if not being used.
- Unplug the computer cord when the computer is off. Many computer cords have an energy pack as an attachment. When plugged in, the energy pack draws electricity.



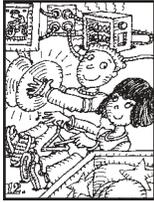
Puzzle piece #10, Boy with Soup and Sandwich

- The electrical outlet plug-ins indicate a great deal of electricity being used.
- The multiple use of one outlet is very unsafe.
- The airplane drawing reminds us of the use of petroleum products for transportation.
- The electric train set shows how some toys may use energy.



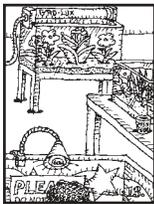
Puzzle piece #11, Boy and Ukulele

- The picture taped to the desk indicates the use of energy by industries.
- The other picture shows the all-important presence of the sun as the ultimate energy source.
- The boy must use his energy to create sounds.
- Sound is a form of energy.



Puzzle piece #12, Girl and Cymbals

- The motorcycle in the pictures is an energy user.
- The electrical outlet is unsafe when overloaded as shown.
- The space heater consumes a great deal of electricity, which is converted to heat.
- The boy is wearing a sweater, which is one way to conserve room-heating energy.
- The girl is using body energy to make the cymbals give off sound energy.



Puzzle piece #13, Gro-lux and Plants

- The fluorescent tube light is more efficient than incandescent lighting. The close proximity of a window indicates that a better alternative might be natural solar energy.
- The plants must have light energy for growth and survival.
- The fish will have energy requirements similar to other animals.
- The food supplies energy for the fish's survival.
- The wall spotlight consumes electrical energy. A Compact Fluorescent Light (CFL) is more efficient than an incandescent, which gives off heat energy.



Puzzle piece #14, Girl and Aquarium

- The wall outlet is the electrical connector for the equipment nearby.
- The tape recorder and speakers represent users of electrical energy for recording and playing back sounds.
- The aquarium contains fish and plants. Each requires energy, the former through food, the latter with light.
- The air pump is run by a small electric motor that consumes energy.
- The fish food supplies energy to the fish.



Puzzle piece #15, Boy and Copier

- The boy is wearing a sweater, which is one way to conserve energy necessary to heat the classroom.
- The waste basket is filled with paper, which could probably be recycled. Recycling helps to conserve energy and trees otherwise needed to make new paper.
- The copier requires electrical energy for its operation, which involves numerous energy conversions (light and mechanical) and the creation of wasted heat energy.
- The copier setting of 20 may or may not indicate wasteful use of the copier. (Note only 14 students in the room.)
- Print front and back copies to get maximum use from each sheet of paper and energy.



Puzzle piece #16, Girl and Copier

- The copier requires electricity for its operation.
- Recycling paper is one way to save on energy resources.
- Both pop bottles and cans are recyclable. Recycling is a way to save energy and resources.



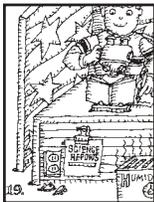
Puzzle piece #17, Girl and Calculator

- The garbage can contains a number of things that could probably be recycled to save on both energy and resources.
- The girl can put the sweater on if she gets cold.
- The calculator requires an energy source in the form of a battery, which stores and supplies a small amount of electrical energy necessary for its operation.
- The thermometers represent important instruments for energy studies (such as the heat distribution in a classroom).



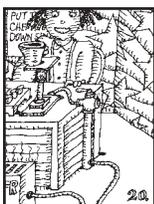
Puzzle piece #18, Boy at Desk

- The graph might show classroom temperature data for a single day, a week, or even a month of studies.
- Energy conservation rules could be made up for any classroom.
- The rug acts as an insulator and feels warmer than the cold floor (which, in contrast, is a good conductor of heat away from a warm body).
- The books are reminders that much can be learned about energy from the library.



Puzzle piece #19, Boy and Microscope

- Microscopes sometimes require electrical energy to supply enough light for proper viewing.
- The "science reports" are reminders that energy can also be studied. In some cases, experiments (especially on the temperature of things) can be made into reports.
- The electrical outlet is a connector for appliances and equipment requiring electricity.
- The humidifier uses energy.



Puzzle piece #20, Girl and Burner

- The thermometer in the container is an instrument to determine the amount of heat energy present.
- The burner uses natural gas, which is a non-renewable energy source.



Puzzle piece #21, Sink and Headset

- The dripping faucet wastes water, but may also waste the energy needed to heat the water.
- The headset on the reader requires electrical energy for its operation.