

HOW MUCH ELECTRICITY DOES IT USE?

*Lesson from the Green School's Tool Kit Manual for use in conjunction with the tool kit

Objective: Students will use a watt meter to see how much electricity a device uses.

Suggested Grade Level: Can be modified for grades 2 – 9

Equipment:

- Watt meter*
- Devices or appliances to test

* From Green Schools Tool Kit

ADVANCED PREPARATION

Find out your local electricity rates from your utility company.

LEADING THE INVESTIGATION

1. Explain to students that they will use a watt meter to identify the real cost of operating an appliance or tool. Choose an item to test. Possibilities include a computer, refrigerator, desk lamp, window air condition, soda/juice machine, television or radio.
2. Plug the device to be measured into the watt meter.
3. Plug the watt meter into the wall socket.
4. The meter turns on in the watt mode. The default electricity rate is \$0.08 per kWh. If your rates are different, refer to the owner's manual to adjust it to the correct value.
5. Students can do different investigations depending on the appliance they monitor:
 - For a refrigerator or air conditioner, which cycle on and off, have students monitor it for a couple of weeks to determine how much time it is off and on. You might also monitor for a period, then clean the heat exchanger and monitor it again for the same period to see how cleaning affects the appliance's efficiency.
 - For computers, students might test two or three different ones. They should leave each computer plugged into the watt meter for a week. They could test to see how much energy is used when the monitor is on versus off. If possible, they could also compare an Energy STAR computer to one that is not. Energy STAR appliances and computers meet energy efficiency guidelines set by the EPA and US Department of Energy.
 - For a soda machine, keep the unit plugged into the watt meter for a week. Soda machines are basically refrigerators, but they also have large inefficient lights. The typical lights used in newer machines consume a total of 204 watts.

6. Record the readings from each mode.
7. Unplug the watt meter. Unplug the device from the watt meter and plug the device back into the wall socket (if appropriate).

FOLLOW UP

- Students use the data from this investigation to extrapolate the monitored cost into an annual cost. For appliances like a refrigerator, evaluate whether or not upgrading to a more energy efficient model would be cost effective.
- Students calculate the energy cost of operating the school's soda machine and the cost of operating just the lights in the door.
 - Find out whether the operating costs are taken into account when the school determines what to charge for the soda. Discuss: Should the price of any product truly reflect the energy cost to deliver it?
 - Find out whether the soda machines are left on during the summer months when no one is in school. If so, why and what does that cost?

Consider recommendations to make to the administration to reduce the energy cost of the soda machines, such as removing the lights and disconnecting the ballast, or having the machines unplugged during the summer.