

Name: _____ Class: _____ Date: _____



"Ghost Loads" and Phantom Power: Evaluating Electrical Devices



Learner Outcomes:

- Apply appropriate units, measures and devices in determining and describing the quantities of energy transformed by an electrical device, by:
 - o Measuring amperage, and voltage and calculating the number of watts consumed by an electrical device, using the formula $P = I \times V$
 - o Calculating the quantity of electric energy, in joules, transformed by an electrical device using the formula $E = P \times t$
- Investigate and describe techniques for reducing the waste of energy in common household devices

Key Terms:

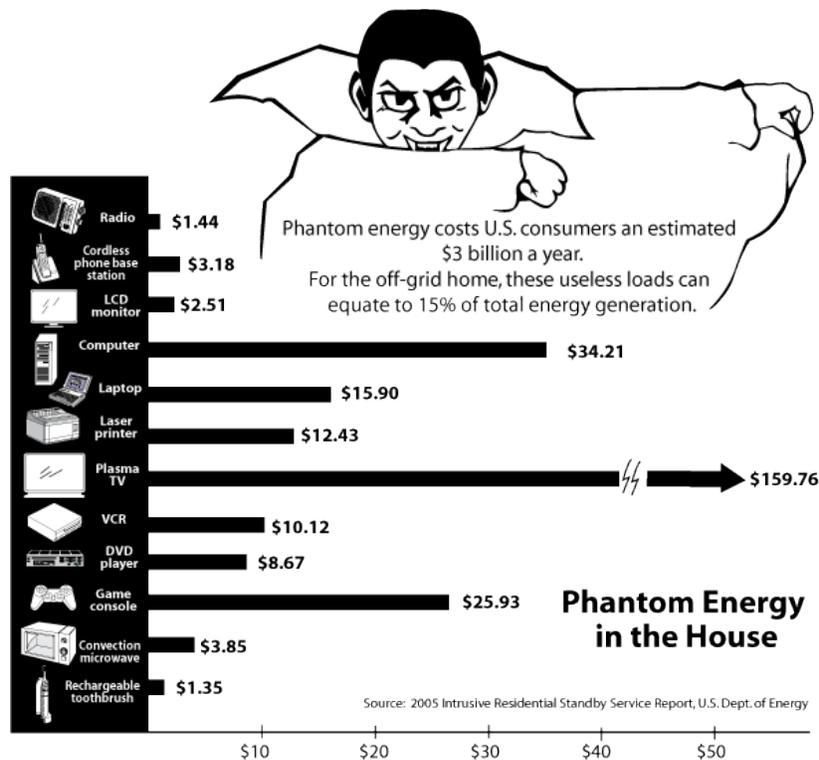
Voltage	Energy	Amps
Amperage	Joules	Volts
Power	Watts	

Background Information: Did you know that many appliances and electronic devices use small amounts of electricity even when they appear to be turned off?

This use of electricity is referred to as "phantom power." Phantom power is most commonly consumed in electronics that have a clock, timer, indicator light or automatic start, such as remote control TVs, VCRs, video game consoles, alarm clocks, microwave ovens, cable boxes, and computers. These electronic devices draw power to maintain signal reception capability, monitor conditions, power internal clocks, charge batteries, or display information.

In the average home, 75% of the electricity used to power home electronics is consumed while the products are not even in use. Although individually, each device uses only a small amount of phantom power, many devices consuming a little bit 24 hours a day, 7 days a week can add up to be quite a lot!

Reference: http://www.aroundhawaii.com/lifestyle/art_and_leisure/2008-10-minimize-phantom-loads.html



Reference: <http://aztext.com/blog/index.cfm?a=showone&EID=91>

Research Question: How much energy do common electrical devices consume while in use and when not in use?

Materials:

**Electronic energy meter

Variety of electrical devices

Electrical chargers / adapters
Calculator

Procedure:

1. Plug in the electronic energy monitor into a wall socket.
2. Plug in an electrical device into the monitor
3. Record the wattage, voltage and current consumed by the electrical device in your data table.
4. Repeat steps 2-4 using a variety of electrical devices in the "on" and "off" modes. (i.e. cell phone charger, X box game, radio, alarm clock, blow dryer, toaster, microwave, lamp, etc)
5. Repeat steps 2-4 using an electrical device with variable controls (light dimmer, fan speeds, sound, one or multiple lights, etc)

Analysis:

1. Which devices used "phantom power"? Did you notice any similarities between them?
2. Which devices cost the most to operate? Why?
3. What impact did variability have on power consumption?
4. Without an energy monitor, how could you tell if a device was using phantom power?
5. What form of energy is most commonly given off from devices that use phantom power?
6. How might you reduce the use and waste of energy in household devices? Will it work for all devices?

Conclusion: Summarize what you found out about how much energy devices consume when in use and when not in use.

Extension:

1. Select one room in your home and identify all of the electrical devices that are used in that room. Research and calculate the total electricity cost for that room for one month, and for one year. You may use manufacturer's labels, print or online information or an energy monitoring device to determine the energy consumption of each item in the room.
2. Create an original poster, commercial, or brochure on 'phantom power' intended to inform consumers about energy waste through ghost consumption. In your presentation, include some specific examples illustrating how much waste or what the cost of electricity waste is for some of the more common and wasteful devices. (Do NOT copy the graphic provided in this activity sheet).
3. Design an experiment to test how different ways of using a 'multi-function' device might influence power consumption of those devices. (i.e. different video game controllers, different computer applications, etc.)
4. Try out a different method of testing the "phantom load" in your house. Go here: <http://www.kouba-cavallo.com/phantom.html>