Which Bulb Is Best?

Fourth Grade
Activity: 5
Time: 1 Class Period

General Description
Students will compare cost and efficiency of incandescent and fluorescent lights.

Objectives
Students will calculate the cost and efficiency of incandescent and fluorescent lights to decide which light bulb would be the better choice.

Arizona State Standards
SC04 S1C2 PO5 Record data in an organized and appropriate format (e.g., t-chart, table, list, written log)
SC04 S1C3 PO1 Analyze data obtained in a scientific investigation to identify trends
SC04 S1C4 PO1 Communicate verbally or in writing the results of an inquiry
SC04 S1C4 PO3 Communicate with other groups or individuals to compare the results of a common investigation
SC04 S4C3 PO4 Describe ways in which resources can be conserved (e.g., by reducing, reusing, recycling, finding substitutes)

W04 S1C1 PO1 Generate ideas through a variety of activities (e.g., brainstorming, graphic organizers, drawing, writer's notebook, group discussion, printed material)
W04 S1C1 PO5 Maintain a record (e.g., lists, pictures, journal, folder, notebook) of writing ideas
W04 S3C2 PO1 Record information (e.g., observation, notes, lists, charts, map labels, and legends) related to the topic
W04 S3C4 PO1 Write persuasive text (e.g., advertisements, paragraph) that attempts to influence the reader

M04 S2C1 PO3 Interpret graphical representations and data displays including single-bar graphs, circle graphs, two-set Venn diagrams, and line graphs that display continuous data
M04 S4C4 PO1 Identify the appropriate measure of accuracy for the area of an object (e.g., square feet or square miles)
M04 S4C4 PO3 Select an appropriate tool to use in a particular measurement situation

Teacher Background
An incandescent bulb, invented by Thomas Edison and most commonly used in the home, glows when its filament is heated to a high temperature by the electricity flowing through it thereby getting very hot when turned on. It has changed very little in the last 100 years. Incandescent lighting is very inefficient - only about 10% of the energy input becomes light and the rest is wasted energy.

In a fluorescent light, electrical energy is used much more efficiently, lasts much longer and uses much less energy to produce the same amount of light. Electrons emitted by an electrode in the

conventional fluorescent light excite atoms, producing ultraviolet light. This ultraviolet light causes the phosphor layer, which coats the inside of the fluorescent tube, the fluorescent, to emit light ... but very little energy. There are now also compact fluorescent bulbs which can screw directly into most lamps and ceiling fixtures.

Students should have their parents help them with this activity

Materials

Pictures of both types of light bulbs
Copies of Activity Card 4-5
Calculators

Procedure/Exploration

1. Have the students brainstorm items containing light bulbs of any kind. (Remember toaster oven, refrigerator, sewing machine, etc.)
2. Explain that wattage is a measure of electrical power. Show students how to find the wattage of an incandescent light bulb and a fluorescent light bulb.
3. Model for students how to complete the wattage chart. Remind them to ask their parents for help.
4. Share results of wattage surveys. Graph student results.
5. Students record in logs what they have learned.

Possible Extension

Students can design a brochure providing the facts about incandescent and fluorescent light bulbs.

Are All Lights Created Equal?

Fourth Grade
Activity: 5
Activity Card: 4-5

Student's Name: **Date:**

*The standard unit of measure of electrical use is a kilowatt-hour (divide the wattage by 1000 to convert to kwh). The total energy cost is the life expectancy multiplied by both the energy used and the utility cost per kwh.

Example: $\frac{18 \text{ watts}}{1{,}000} \times \$.05 \times 10{,}000 = \$9.00$

	Compact Fluorescent 1,100 lumens	Incandescent 1,180 lumens
Bulb wattage	18 watt	75 watts
Life expectancy	10,000 hours	750 hours
* Total energy cost $ $ (at your cost per kwh)		
Cost of new bulb	+ $ 10.00	+$1.00
Lifetime cost	= $	= $
Number of bulbs to equal longer life bulb	x 1	x
Life cycle cost comparison	= $	= $

Compact fluorescent bulbs last 10 times longer than incandescent bulbs. If an incandescent bulb lasts 1,000 hours, how many hours will a compact fluorescent bulb last?

A fluorescent bulb requires much less energy than an incandescent. If you replace one 100 watt incandescent bulb with an equally luminous, but much more efficient 27 watt compact fluorescent:

> You'll save the equivalent of 800 pounds of energy producing coal and over 365 pounds of Carbon Dioxide and other gases will not be released into the atmosphere

If everyone in our classroom installed one compact fluorescent in his or her home, how many pounds of coal would be saved?

Why do you think compact fluorescent lights cost more at the store? Do you think compact fluorescent lights will always cost more at the store than other kinds of lights?