

SESSION ONE

Topic: *“Electricity Is All Around You”*

Description: Students will examine the ways they use or benefit from electricity in their daily lives. In a classroom experiment, students will compare time, effort, and results of sharpening pencils using hand-held and electric sharpeners.

Curriculum Components:

- **Math:** Bar charting, estimating, averaging, calculating time
- **Science:** Collecting data, comparing research findings
- **Critical Thinking:** Surveying, sequencing, analyzing

Materials List (For Teacher to Provide):

- One electric pencil sharpener
 - Four small hand-held pencil sharpeners
 - 6 new (never sharpened) pencils
 - A stopwatch or a watch/clock with a secondhand
 - 5 common household or classroom items readily at hand. (Suggestions: pencil, soft drink, any item of clothing, jewelry, aspirin tablet or any medication, etc.)
- Copies of handouts for each student in class.

Handouts (Masters for Copying):

Grades 3 - 5

Handout #1: “Zap Quiz” — How much electricity have you used today?

Handout #2: “Find the Electricity”

Handout #3: “What uses the Most Electricity?”

Grades 6 - 8

Handout #1: “Zap Quiz” — How much electricity have you used today?

Handout #2: “Electricity in Everyday Life”

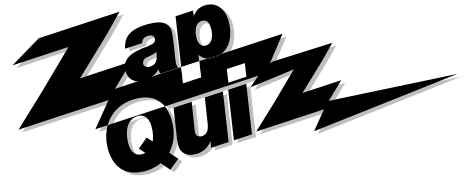
(tracking 5 common objects)

Handout

#3:

What uses

the Most Electricity?”



Classroom procedure:

Setting the Stage

- Distribute Handout # 1, the “Zap Quiz” handout, as a 5-minute timed pop quiz to test students’ awareness of electricity use in their daily lives.
- Have several students read their lists; open floor to discussion as students think of additional uses.
- Conclude “Zap Quiz” discussion by emphasizing that electricity is a very useful, real-world way of using scientific and mathematical knowledge to improve our daily lives. Point out that electricity is an integral part of modern life that is all around us, but seldom noticed — until it’s missing.



SESSION ONE

(Grades 3 - 5) Distribute Handout # 2, "Find the Electricity"

Ask students to circle all the ways they see electricity being used in the picture.

Review and discuss their findings, then ask them to think further: Is electricity used to make some of the objects in the picture? If so, how?

(Grades 3 - 5) Distribute Handout # 3, "What Uses the Most Electricity?"

Have students make a bar graph (with legend) to show electrical usage for different household purposes. Discuss and ask questions based on worksheet. For example:

1. What uses the most electricity in most people's homes?
2. Which uses more electricity — lighting or hot water?
3. Name three ways to save electricity.

(Grades 6 - 8) Distribute Handout # 2, "Electricity in Everyday Life."

Guide the class in selecting five common household or school items for review. (Suggestions: pencil, CD, soft drink, deck of cards, sweater, etc.) Have students collect these items and place them on a table at front of room.

1. Using handout as a guide, ask students to analyze electricity's role in the life-cycle of each object — harvesting raw materials, manufacturing, sale/distribution, storage, daily use, and disposal.
2. Review and discuss:
 - Is there any item for which electricity is not used?
 - Does electricity make the item more or less costly?
 - Could the item be made without electricity? How?
 - Without electricity, would this item exist?

(Grades 6 - 8) Distribute Handout # 3. "What uses the Most Electricity?"

Have students calculate and graph comparisons of energy use (provided on worksheet) by individual appliance, then lead discussion and ask questions based on the information.

Activity: Using Electricity to do Work.

Choose 8 students to sharpen pencils; designate remainder of class as "timers." One at a time, have 4 students sharpen pencils using the electric sharpener, and have 4 students use small manual sharpeners.

Assist the class in timing each student's work as it is being performed. As each pencil is sharpened, allow the class to examine the quality of work and to question the worker. Which pencils are sharper? Which method had more waste (broken pencil points, etc.)? Which method used more human energy?

Have students calculate an average time for sharpening one pencil by electricity and another average time for sharpening a pencil manually. (The contrast will be dramatic: about 4 seconds by electric sharpener; about 2.5 minutes by hand.)

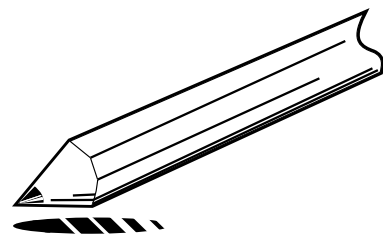
Using the averages, have students calculate total student-hours required to sharpen one pencil each, manually and electrically, for every child in school.

Example:

If your school has 400 students...

$400 \times :04 \text{ seconds} = 1600 \text{ seconds} = 26.6 \text{ minutes}$

$400 \times 2.5 \text{ minutes} = 400 \times 150 \text{ seconds} = 60,000 \text{ seconds} = 1000 \text{ minutes} = 16.6 \text{ hours}$

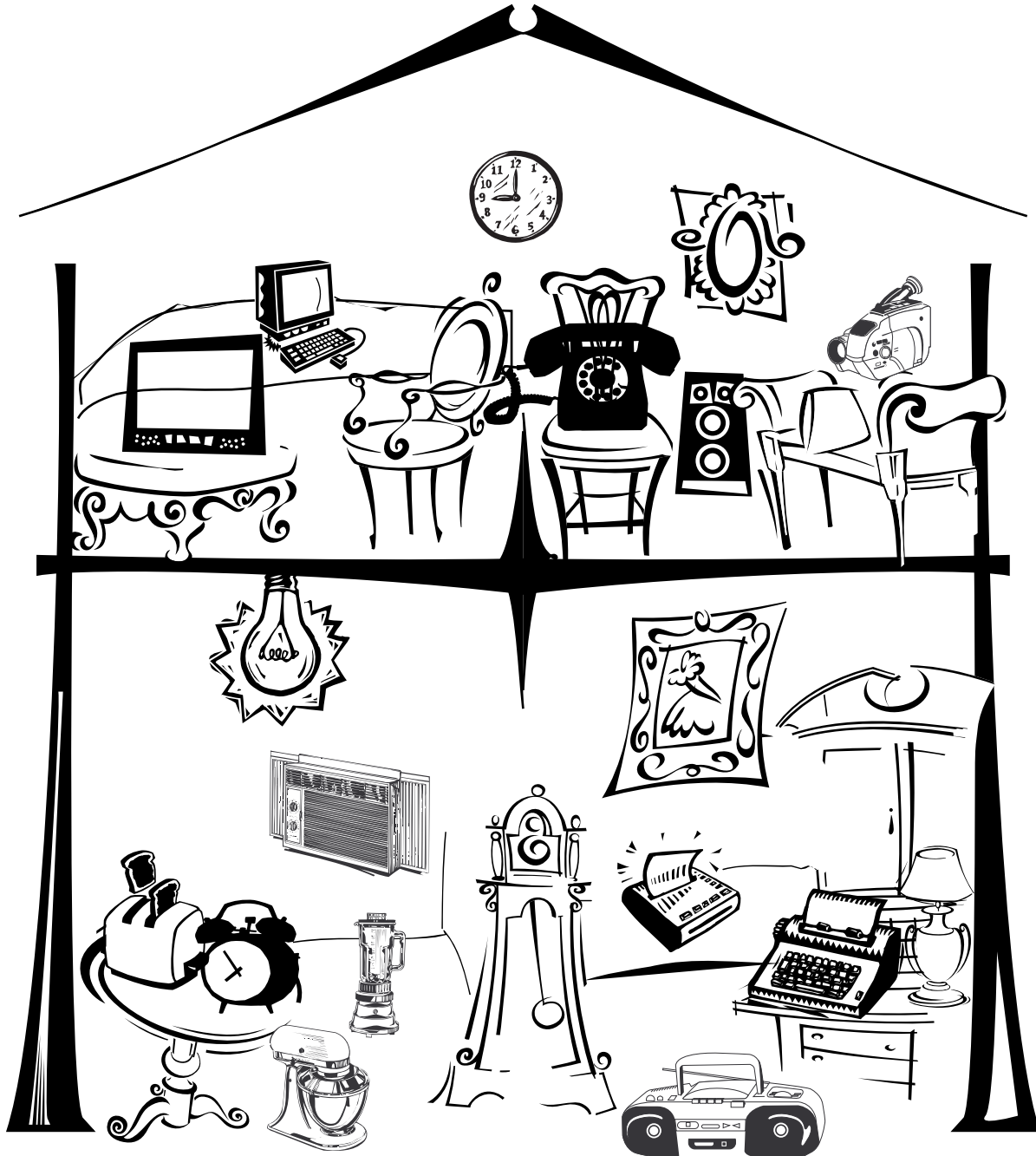


SESSION ONE: HANDOUT #2
(Grades 3 - 5)

FIND THE ELECTRICITY



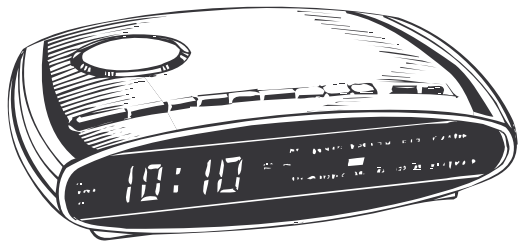
Circle all the ways you see electricity being used.
You should find at least 10 examples.



SESSION ONE: HANDOUT #2 (Grades 6 - 8)

ELECTRICITY IN EVERYDAY LIFE

Your class has chosen five common items you probably see every day. List each object, then identify how electricity is used in its life cycle. Do all the items you've chosen require electricity at some point in their life cycles? Can you think of any modern household items that do not require electricity in some way? Are there acceptable non-electric substitutes or alternatives for the electricity-using steps? A sample entry has been done for you.



OBJECT: Pencil

How was electricity used in:

Harvesting raw materials

Power Saws

Manufacturing

Assembly lines, lights, cutting wood, shaping erasers, painting, lettering

Distribution

Computerized order forms, telephones

Storage

No known electrical requirement

Daily use

Writers need light to see by, electric sharpeners

Disposal

Grinding to sawdust to recycle?



OBJECT: _____

OBJECT: _____

How was electricity used in:

How was electricity used in:

Harvesting raw materials

Harvesting raw materials

Manufacturing

Manufacturing

Distribution

Distribution

Storage

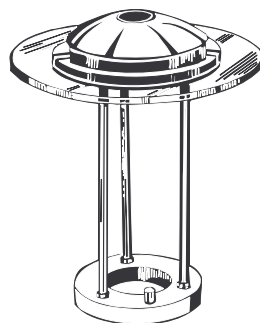
Storage

Daily Use

Daily Use

Disposal

Disposal



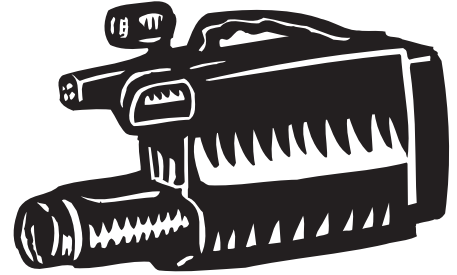
SESSION ONE: HANDOUT #3

(All Grades)

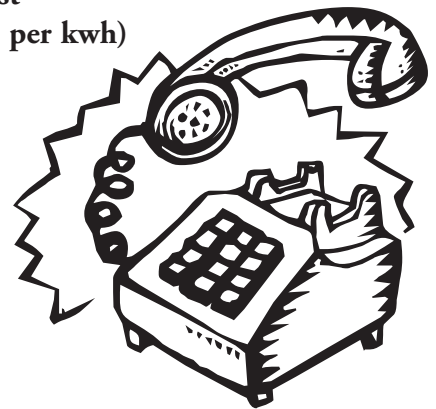
WHAT USES THE MOST ELECTRICITY?

What do you think uses the most electricity in your house? The lights? The refrigerator? The television? Use the information below to make a bar chart to compare electricity use.

If you wanted to save energy — to conserve our natural resources or to save money on your electric bill — which things would you be willing to cut back on? Which would save more: never watching TV again (!!), or using your air conditioner slightly less every day during the hot months?



Appliance	Average kilowatt-hours of electricity use per year	Yearly cost (7.5 cents per kwh)
Color television	197 kwh/year	\$ 14.78
Air conditioning (central)	4,576 kwh/year	\$343.20
Hair dryer	50 kwh/year	\$ 3.75
Household lights	844 kwh/year	\$ 63.00
Refrigerator	966 kwh/year	\$ 48.75
Water heater (electric)	3,562 kwh/year	\$267.15
Clock	25 kwh/year	\$ 1.87
Home computer	130 kwh/year	\$ 9.75



Source for kilowatt-hour usage of appliances: Georgia Power Market Research Department, Atlanta, Ga; additional figures from *The State of the Art: Appliances*. RESOURCE, Boulder, Colorado, page 10, Energy Information Administration (1993).

Source for costs: Based on 1995 Georgia Power residential customer average price of 7.5 cents per kilowatt-hour.

