

# LESSON 1

## How Much Electricity Do We Use?\*

\*Based on the poster article "Who Turned on the Lights—and What Made Them Go On?"



**Objective:** To calculate the amount of electricity used and its cost.

### Overview

Students will use calculators to determine the amount of electricity used by themselves, their families, classes, schools, towns, etc., based on national averages of electricity use. An extension is to calculate the associated cost of that electricity use.

### Standards Addressed

#### Common Core Mathematics Standards (Grade 4):

- Generalize place value understanding for multi-digit whole numbers.
- Use place value understanding and properties of operations to perform multi-digit arithmetic. (4.NBT.1-4.NBT.6)

### Materials

- Calculators

### Activity Steps

1. Tell students that electricity use is measured in kilowatt-hours (kilowatts per hour or kWh). To give students a frame of reference, show the "Average kWh for Classroom Items" part of the Electricity Data List.
2. Have students estimate their electricity use in a day. How many kWh do you think you use?
3. Show the rest of the Electricity Data List, and have students calculate their daily electricity use. What numbers should you use to calculate your daily use?  
958 kWh per household per month, divided by 30 days in a month, which equals about 32, then divided by 2.6 (the size of the average American household) = 12.3 kWh per person per day.  
How does that compare to their estimate?
4. Now that they have calculated the average daily use per person:
  - a. How much electricity does your family use in a day?  
Multiply the number of family members by 12.3.  
A family of 4 would use 49.2 kWh per day
  - b. How much electricity does your class use in a day?

### Electricity Data List

Source: The United States Energy Information Administration ([www.eia.gov](http://www.eia.gov))

- Average kWh for Classroom Items:  
Computer: 0.258 kWh  
Air conditioner or Heating: 1 kWh  
Standard fluorescent bulb in ceiling lights: 0.5 kWh  
Pencil sharpener: 0.08 kWh
- Average American household used 958 kWh of electricity per month in 2010.
- Assume 30 days per month.
- Average American household has 2.6 people.
- Average cost per kWh in the United States was \$0.1154 in 2010.
- It takes about one ton of coal (2000 pounds) to produce 2500 kWh of electricity. The ratio of pounds of coal to kWh of electricity produced is 1:1.25.

Multiply the number of students in the class plus the teacher by 12.3. A class of 25 students plus one teacher would use 319.8 kWh per day

- c. How much electricity does your school use in a day?

Multiply the number of students and staff in your school by 12.3.

- d. Locate the information for your town and state's population. Multiply those numbers by 12.3 to see how much electricity your town and state use daily.

The United States has a 2012 population of approximately 312.8 million. How is that number entered on a calculator? (312800000) Multiply that by 12.3 and you get 3,847,440,000 kWh, the approximate amount of electricity generated for U.S. households, which is about 37 percent of total demand for electricity.

**Note:** Some calculators only go up 8 places, so this number may be too large to be calculated. Check your class's calculators beforehand.