

Knowing Energy: Tea at Home



Energy Revealed Activity

Level 1-2: Grades 3-8

Level 3-4: Grades 9-12

Main Objectives

This activity and the associated video get learners to solve how much energy it requires to make a cup of tea with their own electric tea kettle. It allows learners to experiment with the concepts of energy and phantom power.

Learning Outcomes

By the end of this activity, learners will:

- Complete a tea at home experiment to calculate the amount of energy required to make a cup of tea
- Practice utilizing equations to answer basic energy questions in their worksheet

Length of Activity

30 minutes - 1 hour

Materials List

General Overview Guide

Tea at Home Learner Worksheet

Tea at Home Learner Worksheet Answer Key

Coffee maker or kettle with room temperature water

Kettle Wattage on kettle label (assume 1,500 Watts otherwise, if not provided)

Timer

Step 1

Review the General Overview Guide to understand how the Knowing Energy Video Series works with its associated activities.

Step 2

- a. Allow learners to view the Kettle Experiment Video (1:39 minutes) and hand out the Tea at Home Learner Worksheet. Depending on the learner's grade level, direct them to complete either or all of levels 1-4.
- b. The video itself will direct learners on what to do, so allowing them to re-watch, or to go over their task as a class is vital for their understanding. The experiment itself can be done in pairs.
- c. Be sure to remind learners of the equations, and conversions that were introduced to them in the Energy Basics, and activity videos. These concepts can be further discussed as a class before learners tackle this worksheet.

Step 3

Be sure to go over as a class the answers to the worksheet and refer to the Tea at Home Learner Worksheet Answer Key for any confusion.

Teaching Tips

1. Level 1

- Time to boil the water will need to be converted to hours, either minutes or seconds to hours. To convert the W to kW learners will need to divide the Watts by 1000. The kWh for one pot is the kW x Time in hours. kWh for the year will be kWh for one pot times 365.

2. **Level 2**

- Pots of tea per 1kWh will be the kWh for one pot divided by 1kWh. Coldwater should take longer and hot water quicker, this is often a misunderstood myth. For phantom power, learners can use a plug-in power meter if available (sometimes at libraries) or look for any indications on the kettle (lights or sounds when it isn't boiling water).

3. **Level 3**

- The volume should alter the time, more water = longer time and vice versa. To find phantom power the best thing to do is turn off lights and look for indicator lights on devices. Computers, TVs and gaming systems are notorious for this.

4. **Level 4**

- It is likely the phantom power is higher (see solutions), but it depends on how many pots you boil in one day. Other variables include, but are not limited to; temperature, insulation around the kettle and salt in water, etc. for the bonus learners should sum up what they think is the approximate phantom power and multiply by the total number of hours in a year.