KILL- A WATT –

BE AN ENERGY CONSERVATION AMBASSADOR

Background and Purpose

We use electricity in our lives everyday. Electrical alliances require varying amounts of power to operate. Power (watts) is a measure of the instantaneous energy usage. Measuring the power use of an appliance and the time it is used can be used to calculate the total electrical energy consumed

 Energy = Power X time

 (kWh = watts/1000 X hours)

Watt meters provide a convenient way to measure power consumption. Power consumption can also be determined through the appliance rating stamped on the appliance. For example, light bulbs are rated as “75 W” or “100 W” to indicate that they use more or less power and, therefore, produce more or less light.

The purpose of this activity is to estimate and then test the power consumed and the energy consumed by several household appliances.

Materials

1. Kill-a-Watt meter for each group of 4 students
2. *Individual Data Sheets to Predict Energy* Usage; *Team Consensus Data Sheets to Predict Energy Usage*; *Data Results Sheets for Individual Energy Usage* and *Data Results Sheets for Team’s Prediction of Energy Usage*

***NOTE: Google Sheets can be used for teams to record and graph their predictions in real time****.*

1. 6-8 electrical appliances (examples could include: hair dryer, microwave, hot pot, radio, small TV, computer, cell phone or battery recharger, toaster, lamp with light bulb; string of LED or standard holiday lights, etc.)

Procedure

1. Teacher conducts Human Graph Activity to establish groups of 4 students and engages them in establishing team roles;
2. Teams are presented with Motivation Presentation and Hook of Lesson get a watt meter
3. Starting at the first station to which your team is assigned (extra time is allowed to explore and learn how to use the Kill a Watt meter)
	1. Plug the watt meter into the wall and the appliance into the watt meter.
	2. Explore with the watt meter to find the setting that reports “power,”
	3. Record the watt reading and name of the appliance on the data sheet.
	4. Explore the potential impact of various settings on the power consumption (for example, low versus high setting on the hair dryer, or on and off). Record the power consumed.
	5. Estimate the time you use this appliance at home, record that time on the data sheet (teams estimate one hour for small appliances; four hours for television; 24 hours for refrigerator).
4. Rotate among other stations at the direction of your teacher and repeat step 2 for the other appliances
5. Calculate the energy consumed for each appliance on the data sheet
6. Answer the discussion questions. Prepare your Persuasive Presentation for classmates to reduce their household energy consumption.

Kill-a-Watt Meter Individual Prediction Sheet

Enter prediction for each appliance in *rated* row of this table.

If there are multiple settings tested for the appliance, you can use multiple rows.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Appliance name** | **Setting / comments** | **Power or current specified on appliance** | **Power (W)****(measured)** | **Estimated time used daily (h)** | **Energy consumed daily (kWh)\*** |
| 1 |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |
| 5 |  |  |  |  |  |  |
| 6 |  |  |  |  |  |  |
| 7 |  |  |  |  |  |  |
| 8 |  |  |  |  |  |  |
| 9 |  |  |  |  |  |  |
| 10 |  |  |  |  |  |  |

\* energy (kWh) = power (W)/1000 X time (h)

Kill-a-Watt Meter Team Prediction Sheet 

Enter prediction for each appliance in *rated* row of this table.

If there are multiple settings tested for the appliance, you can use multiple rows.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Appliance name** | **Setting / comments** | **Power or current specified on appliance** | **Power (W)****(measured)** | **Estimated time used daily (h)** | **Energy consumed daily (kWh)\*** |
| 1 |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |
| 5 |  |  |  |  |  |  |
| 6 |  |  |  |  |  |  |
| 7 |  |  |  |  |  |  |
| 8 |  |  |  |  |  |  |
| 9 |  |  |  |  |  |  |
| 10 |  |  |  |  |  |  |

\* energy (kWh) = power (W)/1000 X time (h)

Kill-a-Watt Meter Individual Data Sheet

Enter information for each appliance in *rated* row of this table.

If there are multiple settings tested for the appliance, you can use multiple rows.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Appliance name** | **Setting / comments** | **Power or current specified on appliance** | **Power (W)****(measured)** | **Estimated time used daily (h)** | **Energy consumed daily (kWh)\*** |
| 1 |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |
| 5 |  |  |  |  |  |  |
| 6 |  |  |  |  |  |  |
| 7 |  |  |  |  |  |  |
| 8 |  |  |  |  |  |  |
| 9 |  |  |  |  |  |  |
| 10 |  |  |  |  |  |  |

\* energy (kWh) = power (W)/1000 X time (h)

Kill-a-Watt Meter Team Data Sheet

Enter information for each appliance in *rated* row of this table.

If there are multiple settings tested for the appliance, you can use multiple rows.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Appliance name** | **Setting / comments** | **Power or current specified on appliance** | **Power (W)****(measured)** | **Estimated time used daily (h)** | **Energy consumed daily (kWh)\*** |
| 1 |  |  |  |  |  |  |
| 2 |  |  |  |  |  |  |
| 3 |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |
| 5 |  |  |  |  |  |  |
| 6 |  |  |  |  |  |  |
| 7 |  |  |  |  |  |  |
| 8 |  |  |  |  |  |  |
| 9 |  |  |  |  |  |  |
| 10 |  |  |  |  |  |  |

\* energy (kWh) = power (W)/1000 X time (h)

Discussion questions- (formative assessment)

1. Which of the appliances had a known power rating or current (amps)?
How did your measured power compare with the power specified on the appliance? Discuss any differences. (Note – if current (amps) was specified, power can be calculated as Power = volts X amps; the voltage of standard power outlets is 120 V)
2. Which appliance did you expect to use the most ***power***? Why? Did you find this to be true?
3. Of the appliances tested, which one did you calculate to use the most ***energy*** in your home each day? Is this what you expected? Why?
4. Based on the measurements made in this activity, Can you suggest a way that you can conserve energy in your home?