Energy in the Home Lesson Worksheet

**LESSON OBJECTIVES:**

* Understand how household items consume energy.
* Learn to use Google Sheets for data entry and analysis.
* Calculate energy consumption and cost using formulas.
* Develop energy-saving tips based on data analysis.

**Overview**

In this activity, you will calculate the energy consumption of various household items and how much it costs to use them. You'll use Google Sheets to input data, apply formulas, and create charts that visualize energy use.

**Formula Used**

* Energy Transferred (Joules, J):  
  Energy Transferred=Power (W)×Time (s)
* Cost Calculation:  
  Cost=Power (kW)×Time (hours)×Price (per kWh)
* Conversions:

1 Kilowatt (kW) = 1000 Watts (W)

**Guide**

1. Access the Google Sheet:

Go to the link: <https://docs.google.com/spreadsheets/create> and create a new sheet

Name it surname\_engage\_energy

1. Data Entry:

In your copied sheet, enter the following data into the table provided. Follow the example format to complete each row.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Item | Area Used | kW per Second | W per Second | Time Used (seconds) | Total W |
| Kettle | Kitchen |  | 2000 W | 180 |  |
| Fridge | Kitchen |  | 150 W | 86,400 |  |
| Microwave | Kitchen |  | 1200 W | 120 |  |
| Toaster | Kitchen |  | 800 W | 120 |  |
| Oven | Kitchen |  | 2400 W | 3600 |  |
| Dishwasher | Kitchen |  | 1800 W | 3600 |  |
| Tumble Dryer | Laundry Room |  | 2500 W | 3600 |  |
| Washing Machine | Laundry Room |  | 2000 W | 3600 |  |
| Vacuum Cleaner | Various Rooms |  | 1000 W | 1200 |  |
| Laptop | Office |  | 60 W | 14,400 |  |
| Phone Charger | Various |  | 5 W | 7200 |  |
| TV | Living Room |  | 100 W | 10,800 |  |
| Lightbulb | Various |  | 10 W | 18,000 |  |
| Lamp | Various |  | 40 W | 14,400 |  |
| Hairdryer | Bathroom |  | 1500 W | 300 |  |
| Iron | Laundry Room |  | 1200 W | 600 |  |
| Electric Oven | Kitchen |  | 2400 W | 3600 |  |
| Heater | Living Room |  | 1500 W | 7200 |  |
| Fan | Bedroom |  | 50 W | 14,400 |  |
| Blender | Kitchen |  | 300 W | 60 |  |

1. Calculate the Total Energy Used (W):

* For each item, calculate the total energy transferred using the formula:  
  Total Energy (W)=Power (W)×Time (s)
* Enter the calculated value in the “Total Energy (W)” column.
* Example Calculation:
  + For the Kettle:
  + In the "Total Energy (W)" column, use the formula: =B2\*C2
  + This calculates 2000 W \* 180 seconds = 360,000 W
  + Type =C2\*D2 in cell E2 and press Enter.
* Use Google Sheets to Automate This:
  + Click on cell E2, then drag the small square at the bottom right corner of the cell downwards to fill the formula for all items.

Hint: Learn more about formulas here: https://www.w3schools.com/googlesheets/google\_sheets\_formulas.php

1. Convert to Kilowatt-Hours (kWh):

* Convert the total energy in watts to kilowatt by dividing W per Second by 1,000 (since 1 kW = 1000 W)
* Convert this to kW per hour (Hint how many second are in an hour?)

1. Create a Chart:

* Use Google Sheets to create a bar chart comparing the energy used (in kWh) by each household item.
* Go to ‘Insert’ ‘Chart’ and choose bar chart.
* Label your chart as “Energy Usage by Household Items”.
* Customise the chart.

1. Calculate the Cost of Each Item:

* Find the cost of running each item using the cost formula:  
  Cost=Power (kW)×Time (hours)×Price (per kWh)
* Research online or use the value provided by your teacher to find the cost per kWh (e.g., 0.15 £ per kWh).

1. Sum the Total Energy Consumption and Cost:

* Sum the total energy used by all items in kilowatt-hours.
* Calculate the total estimated cost for running all these items.

1. Extension Task: Create a Pie Chart:

* Create a pie chart to compare the total energy used in each area of the house (e.g., Kitchen, Laundry Room, Living Room).

**Tips for Success:**

* Double-check your formulas and conversions for accuracy.
* Make sure your charts are clear and labelled correctly.
* Think critically about which items use the most energy and consider why.

**Reflection:**

Which household items were the most energy-intensive? Why?

What surprised you the most about the cost calculations?

How can this information help you make more energy-efficient choices at home?