Honors Science Name:

Activity - *The High Cost of Using Electricity*

*****DUE TO THE FULL SCHEDULE AS WE END THE YEAR, THIS ASSIGNMENT HAS RECLASSIFIED AS EXTRA CREDIT ONLY...*****

Purpose: To determine the cost of running home appliances.

Background:

Ohm's Law states that V = I·R, similarly, the power dissipated by a load in a circuit can be calculated using P = Energy ÷ time. We know that the energy delivered to a load is just the voltage over the load times the amount of charge moved (W = q·V). Combining all these together we get the result:

$$P = \frac{W}{t} = \frac{qV}{t} = V\frac{q}{t} = VI$$

Power is measured in Watts (W) for very large applications the units of kilowatts (kW) and megawatts (MW) are used. Most electrical devices do not give power ratings directly in Watts. Instead they are classified as 110V and 5A. We can use this information and the formulas above to determine the power delivered to the device. For instance, in the above example, P = I·V = (5A)(110V) = 550 W = 0.55 kW.

The local electric company charges customers for "energy used". Since Power is energy divided by time, the energy used is just the Power times the time. A convenient unit used for energy is not the Joule but the kilowatt-hour (kWh).

Ex: How much does it cost to use a 1200W blow dryer for 10 minutes each day for a month if Detroit Edison charges 0.10¢ per kilowatt-hour?

time = 10 min/day · 30 days = 300 min = 5 hr

power = 1200 W = 1.2 kW

energy = P·t = (5 hr)(1.2 kWh) = 6.0 kWh

total cost = (6.0¢/kWh)(6.0 kWh) = **0.36 ¢**

Procedure:

• Make a list of 8 home appliances that range from light bulbs to stereo systems. Determine the total power consumption to run the device, estimate the amount of time that the device is used per month, and calculate the total energy consumed in kilowatt-hours. Then, get an electricity bill from your parents and find out how much you are charged per kilowatt-hour (if you can't find this information estimate the cost to be 10¢ per kWh) and calculate the monthly cost to run the device. Complete the chart on the back.

Analysis:

•Brainstorm three ways you can save money on electricity use each month.

1.)

2.)

3.)

Device	Power (kW)	monthly time (hr)	Energy (kWh)	cost per kWh	Total Cost ($)

Calculations (show all work for ONE device):

Conclusions: