Name _____ Date _____ Class _____

Power Meter: Demonstration Guide – Answer Key

B. Introduction to Power Meter activity using the scientific method. Fill out the different sections of the scientific method below.

1. **Question** *(What is the question that needs to be answered?)*:

   Is there a difference in energy use between two different types of light bulbs? An incandescent bulb (regular light bulb) and a LED light?

2. **Hypothesis** *(Answer the question and state which light bulb you think will use less energy.):*
   Answers may vary with each student.

3. **Method**: Use the power meter to measure and quantify how much power (in Watts) each light bulb will use. *Note: Do not perform this experiment without the supervision of an adult.*
   a.   Plug your power meter into a wall outlet.
   b.   Plug the lamp into the power meter, put in a light bulb and turn it on.
   c.   Press the middle button to display Watts.
   d.   Read the power used by the light bulb in Watts (W) and record your data in the table below. Repeat and compare with the other light bulb or any other electrical device.

Item name	Power (in Watts)
Incandescent Light Bulb	
LED Light Bulb	
Other:	
Other:	

4. **Result**: Calculate the Energy, in kWh, the CO_2 emissions (in lbs. of CO_2) and the cost for the bulb and energy for the two types of bulbs. Complete the table using the example in the demonstration guide as a reference.

Incandescent bulb **60 W** **1,000 hours** **$0.75** **800 lumens**	**LED Bulb** **9.5 W (60 W equivalent)** **25,000 hours** **$10.00** **800 lumens**

Lighting for 25,000 hours	Incandescent	LED
Energy (kWh)	**1500 kWh**	**237.5 kWh**
CO_2 (lbs.)	**750 lbs. CO_2**	**118.8 lbs. CO_2**
Cost of Energy ($)	**$240.00**	**$38.00**
Total Cost [Energy+Bulb(s)] ($)	**$258.75**	**$48.00**

Calculations:
Note: (values may vary slightly due to each student's measurement of power)

Energy (kWh)
Incandescent: **(60W*25,000 hours)/1,000 = 1,500 kWh**
LED: **(9.5W * 25,000 hours)/1,000 = 237.5 kWh**

CO_2 (lbs.)
Incandescent: **CO_2: 1500 kWh*0.5 lbs CO_2/kWh =750 lbs. CO_2**
LED: **CO_2: 237.5 kWh*0.5 lbs. CO_2/kWh =118.8 lbs. CO_2**

Cost of Energy ($)
Incandescent: **1500kWh*$0.16/kWh = $240.00**
LED: **237.5kWh*$0.16/kWh = $38.00**

Total Cost [Energy+Bulb(s)] ($)
Incandescent: **Cost=$240 + $0.75 (25) = $258.75**
LED: **Cost=$38.00 + $10.00 = $48.00**

5. **Conclusion**
   a. State whether your prediction or hypothesis was correct or not.
      Answers may vary with each student.