

GROUP ASSIGNMENT G-2: ENERGY EFFICIENCY MAKE-UP (worth 5 pts)

YOUR NAME: _____ GROUP # _____

- *First go through Dr H's presentation on Friday Sep 30th. As background to this assignment, focus on Slides 25- 38.*
- *Then print out this Make-Up form and complete Questions # 1 and #2 below on your own.*
- *You won't be able to take the measurements on your own, but we will have the light bulbs and IR thermometers available in class next week on Monday (and Wednesday too if needed) so you can take the measurements that you missed. Try to come to class early or stay a bit after so you can complete this part of the assignment. Then complete Questions #3, #4 and #5 on your own and turn in a hard copy of this form or email it to Dr H. You may consult with your group members, one of the TA's, or Dr H for help – but to get credit you must complete and turn in this make-up form yourself.*

BACKGROUND:

New light bulbs have reached the marketplace with increased energy efficiency over a standard incandescent bulb. While only 10% of the energy used in a normal light bulb is converted to light (the rest being lost as heat into the surrounding environment), some LED lights achieve up to 80% efficiency. Using an IR thermometer you will test energy efficiency by measuring the thermal energy released from three types of light bulbs: a standard 60-watt light bulb, a CFL bulb, and a LED bulb.

BEFORE MEASURING:

1. Draw an energy flow diagram for each light bulb (spaces provided on reverse side) representing electricity (electromagnetic energy) converted into light (electromagnetic energy) and heat (thermal energy) in the relative proportions based on the handout provided.
2. Would you expect similar temperatures between the three bulbs? Yes _____ NO _____ Why or why not:

MEASURE: *You will have to make up this part of the assignment in class on Monday after Test #2 or on Wed Oct 5th.*

Using the IR thermometers provided, take three measurements from each light bulb from different angles. Write your measurements on the reverse of this document. Turn the light off briefly while taking measurements to avoid injury to eyes. Average the three measurements.

AFTER MEASURING:

3. Do the thermometer measurements support your hypothesis in question 2? Yes _____ NO _____ Explain:

4. After this experiment do you agree with Energy Star and the bulb manufacturers that newer light bulb technologies of CFLs and LEDs are more energy efficient than incandescent light bulbs? Yes _____ NO _____ Explain: _____

Energy Flow Diagram
for an Incandescent bulb

Temperature 1: _____

Temperature 2: _____

Temperature 3: _____

Average Temp: _____



Incandescent bulb

Diagram for CFL bulb

Temperature 1: _____

Temperature 2: _____

Temperature 3: _____

Average Temp: _____



CFL bulb

Diagram for LED w/ 80% efficiency

Diagram for LED you measured

Temperature 1: _____

Temperature 2: _____

Temperature 3: _____

Average Temp: _____



LED bulbs (*technology is evolving!*)

5. The Energy Star website says “When designed properly, an LED circuit will approach 80% efficiency, which means 80% of the electrical energy is converted to light energy.” Based on the temperatures you measured and the wattage of each light bulb, do you think the LED bulb you measured is approaching 80% efficiency?

[Note all 3 bulbs have LUMENS in the range of 800 – 850]

Yes _____ NO _____ Explain:
