

# Energy Efficiency Lab

**Driving Question:** What does it mean to be energy efficient?

After completing this lab you will understand:

1. Different light bulb types use different amounts of electricity to produce similar amounts of light.
2. When energy is converted from electricity to light, energy is “lost” primarily in the form of heat.
3. Heat production is a form of energy conversion. Excessive heat is the result of an inefficient electrical conversion.
4. High efficiency light bulbs help reduce energy consumption.



## Lab Procedure

1. During this lab, you will visit 4 different light bulb stations. Your group will complete observations for one light bulb station at a time. For example: Your group will be at the first light bulb station for 5 minutes. After 5 minutes, you will move to the next station.
2. Each member of your group will have a job during this lab. Your teacher will assign each group member to one of the following tasks.
  - a. **Temperature monitor.** Hold the temperature probe **1 inch away** from the bulb. Some bulbs heat over time. It is important to record the temperature before and after the light is turned on.
  - b. **Light bulb observer.** Watch how quickly the light turns on. Some bulbs turn on immediately with full brightness. With other types of bulbs there may be a delay between turning on the switch and the appearance of light. Some bulbs slowly brighten. Some light bulbs have slightly different colors.
  - c. **Timekeeper.** Keep track of the measurement intervals. Tell your group members when to take measurements.
  - d. **Recorder.** Record observations and temperature measurements provided by your group. Share the results with your group.

### NOTES:

1. Each group member is responsible for copying the measurements from the master investigation sheet and completing their own investigation sheet.
  2. You may rotate jobs between light bulb stations.
3. When you arrive at each light bulb station read the **light bulb type label** that is placed in front of the lamp. Identify your light bulb type on the **appropriate row on your investigation sheet**. You will record data for this station in that row.
  4. Observation Schedule
    - a. **BEFORE:** Measure the light bulb temperature prior to turning on light bulb. Hold your probe or thermometer **1 inch** away from the bulb. Record the temperature in the **BEFORE** column.
    - b. **TURNING THE BULB ON:** Before you turn on the light bulb at your station, your group needs to prepare for a set of measurements that must be taken as soon as the bulb is switched on.
      - i. Measure and record temperature. Write your temperature in the **1 sec** column on your investigation sheet.
      - ii. In the **Observations** column write your observations (see your job description for details).

- c. **THIRTY SECOND INTERVALS:** Repeat the temperature measurement every **thirty seconds**. Your data chart lists elapsed (or ongoing) time, **not** times between measurements.
  - i. Measure and record temperature on your investigation sheet. Record your temperature in the correct time interval column.
- d. **OFF: After the two-minute measurement, turn the light bulb off.**
  - i. **Measure the temperature 30 seconds after the bulb has been turned off.**
  - ii. Note how fast the light turns off. Some turn off immediately; others fade slowly. Record your observations in the **observations** column.
  - iii. Wait **30 seconds**. Measure and record temperature in the **1 min. OFF** column.
  - iv. Wait another **30 seconds**. Measure and record temperature in the **1.5 min. OFF** column.
- e. Repeat this procedure at each light bulb station.



After completing all measurements and observations at each station, complete the **Light Bulb Lab Analysis** section on your investigation sheet.