

Hands-On Activity

Electric Light

In this activity, students will demonstrate the following Inquiry Skills:

- Design Investigations
 - Make or use models that:
 - § Function exactly like or similarly to the real thing
 - Practice lab safety by
 - § Following lab safety procedures
- Gather Data
 - Uses senses to observe
 - § Seeing (color, shape, size, texture, motion)
 - § Touching (temperature, texture, shape, size, vibration, motion)
 - Uses the appropriate format to record data
 - § Diagram
 - § Writing (journal, worksheet, electronic text)
- Communication in Science
 - Record results using
 - § Scientific illustration with proper labeling

Materials:

- For each group:
 - D batteries (2)
 - Paper clips (2)
 - 10 – 14 inch pieces of insulated copper wire, stripped of insulation 1 – 2 inches on each end (5)
 - 3V flashlight bulb
 - Small block of wood
 - Thumbtacks (4)
 - Clothespin
 - Small nail, safe for plaster or drywall
 - Electrical tape
 - Small hammer (2-3, depending on class size)
1. Tape two batteries together in opposite orientations (one positive and one negative terminal showing on each end).
 2. Connect the negative terminal of one battery to the positive terminal of the second battery by using electrical tape to attach a connecting paper clip.

3. Turn the batteries over. Use electrical tape to connect one piece of wire to one terminal, and a different piece of wire to the other terminal.
4. To make a **switch**, connect another wire to a thumbtack, and press the thumbtack and wire through a paperclip into the piece of wood.
5. Connect a different wire to a different thumbtack, and press the thumbtack into the wood block, close enough that the paper clip can swing to touch the second thumbtack. This will be the switch.
6. To build a **bulb socket**, nail a clothespin on its side to a wood block.
7. Wrap the unconnected end of the wire from step #3 to a thumbtack and anchor it under the mouth of the clothespin.
8. Wrap one end of the last piece of wire around the metal contact on the bulb. Place the bulb in the clothespin so that the bottom of the bulb touches the wired tack.
9. Attach the remaining end of the wire wound around the bulb to the wood block using a tack.
10. Connect the wire leading from the positive terminal of the battery to the wire leading directly from the bulb using electrical tape. Connect the wire leading from the tack next to the paper clip (but not attached to the paper clip) to the wire leading from the negative terminal of the second battery with tape.
11. Close the switch. This completes the circuit.

When students have completed a successful circuit, have them diagram it in their notes and describe what is happening in terms of energy transformations (The light bulb is changing electricity from the batteries into light.) Then, after touching the bulb, students should write their observations. Encourage student to connect what they see in the circuit to what they learned in the lesson (The light bulb is also changing electricity into heat.)

Follow up with a class discussion of results from this activity. As part of this discussion, bring up the observation that some of the energy from the electricity was converted to light and some to heat. Ask students: "Is energy ever lost for good? Can you account for all of the electrical energy you put into your system? How?" Be sure that students can cite the example of their bulb as an example of the principle of conservation of energy—that all of the energy going into their system as electrical energy should be accounted for as the sum of the light and heat energy coming out of their system.