

Curriculum Tips

Wiring a House (*Explore-It!*)

When leading this project with students you should work primarily from the curriculum guide (developed at [EDC Inc](#) and available at [Kelvin.com - EDC Products](#)) in order to see how the activities in the project fit together and for detailed coaching on leading the activities and managing materials. The following tips and revisions supplement, but do not replace, the curriculum guide. Further resources, including video, materials lists and professional development tools can be found at the [NPASS2](#) website.

The Main Ideas:

The main goal of this project is to make electricity less mysterious (less scary) to students while at the same time they discovering some of the rules that govern how simple [DC] electrical circuits work. The “house” story provides the need to observe the different brightness’s in the bulbs and sets up the investigation into how different ways to connect batteries, bulbs and wires results in different outcomes (in the bulbs.) Children find this a very real and engaging challenge that also allows plenty of creative leeway to the interior decorators in the group.

The goal of this project is NOT to teach about voltage and current and resistance. The goal is to become skilled at diagnosing the inputs and outputs of simple electrical circuits. The most important habit that children should adopt in order to do this diagnosis is to “follow the pathways.” In this project, a **pathway** is an arrangement of wires, batteries, and light bulbs connected together (or not) and running from one end of the power source (batteries) to the other end (or not). Students observe where/how the batteries, bulbs and wires are connected and learn to predict and understand how these connections make the lights shine more or less brightly. One rule is that electricity will only flow through a **pathway** that consists of an unbroken sequence of metal wires and devices that connect one side of the power source to the other side. Other rules concern whether the devices are connected in one line (series) or several different lines (parallel) They also discover that there can be more than one pathway in a circuit so long as each pathway is continuous and unbroken and can be traced from one end of the power source to the other.

Exploration #1 (Electricity at Home)

This worksheet is more closely related to the idea of building a house, than to exploring the basics of connecting small numbers of batteries and bulbs. We recommend, therefore, that you do begin the project with Exploration #2 and save this activity until right before Expl #4 (or 6)

Exploration #2 (Light the Bulbs)

This activity lets children explore the most basic rules of electrical circuits and pathways. Do not rush through it. Give the children plenty of time to play with all the possible combinations of batteries and bulbs. The point is to learn that electricity needs and unbroken pathway from one end of the battery to the other. The second important set of observations has to do with how brightly the light bulbs shine. Give children plenty of time with one bulb, two bulbs or more, and then more than one battery, to figure out what the brightness patters seem to be.

Use the worksheet (page 10) to focus the students on particular arrangements of batteries and bulbs, **after** they have had time to explore freely. Never begin a session with a worksheet

Exploration #3 (Battery Pack)

See the rule above before using the worksheet on page 20. The battery pack is a convenient and inexpensive way to hold three batteries together and thus increase the amount of power in the circuits and pathways. Making it work is mostly a technical/design issue, although the principle concerning an unbroken pathway applies here too. Since there are three batteries, see what happens if one battery is turned around compared to the other two.

The guide suggests scoring the cardboard to make a clean fold. An easier way is to bend the card over the edge of a table. Make sure the cardboard is about an inch longer at each end than the three batteries lined up so there is plenty to fold over and to push the brass fasteners through. It's very important to get the fasteners tight against the batteries to make a good electrical connection.

Exploration #4 (2-D House)

This activity works best if a) the holiday light bulbs have been cut up very carefully – with 2 – 3 inches of wire on both sides of the bulb, and b) if the 2-D House image (page 35) is photocopied at 85% instead of full size. This brings the four bulbs slightly closer together and allows them to be connected to each other with their own wires behind the house.

Do not extend the bulb wires by adding extra wire. This makes the challenge more confusing for the students because it is more difficult to see and follow the different pathways in the circuit.

If the students have not already noticed that there are two basic ways of connecting bulbs, have them notice it now. The technical terms for these ways are **series** and **parallel**, but we encourage you have let the students invent their own terms initially – words that make sense to them as descriptions of what they observe. In the past terms such as “in a line” (series) or “stacked” (parallel) have served as place holders until the students really see the difference in how these two systems operate and are ready to learn the technical names.

To be continued.....