
LESSON 15

Planning to Wire a House

Overview

At this point in the unit, students have learned many important concepts related to electricity, including how to make circuits, the difference between series and parallel circuits, and how to make a switch. In this lesson, students will have a chance to apply what they have learned by drawing up a plan for wiring a cardboard box “house.” In the final lesson, students will implement their plans.

Objectives

- Students work in teams to use knowledge gained during the unit to draw up plans for wiring a house.
- Students consider different strategies for making an effective wiring scheme.

Background

There is some similarity between the wiring students do to light a cardboard box and the wiring done in a house. For example, students will need to grapple with the way the wires go from the power source (batteries outside the box), through the walls and then into each room, just as electricians do. They will also need to plan for the placement of the switch and the light in a realistic way, with wires going between them.

Students have many other issues to think about as they work on this project. For example, should they use only one D-cell and one light for each room, which would keep the wiring diagram quite simple and self-contained within each of the four rooms? Or, should students use two D-cells as a power source, and have them placed “outside” the house, similar to the way power is sent from the electric company to “real” houses? Encourage students to consider both alternatives.

Another thing students should consider is how bright to make their houses. You can challenge the students to make the lights as bright as possible, using the two D-cells for power. (To make the lights particularly bright, students should wire the D-cells in series and the bulbs in parallel.)

The students also can use paper clip switches to turn the lights in their house on and off. The placement of the switches can offer other challenges to the students. For example, at the simplest level the students might use only one switch to control all the lights. At a more complex level, they might place a switch in each room to control only the light in that room.

Materials

For each student

- 1 student notebook

For every four students:

- 1 cardboard box
- 2 sheets of 8½" x 11" drawing paper
- 1 pencil
- 1 colored pencil or crayon

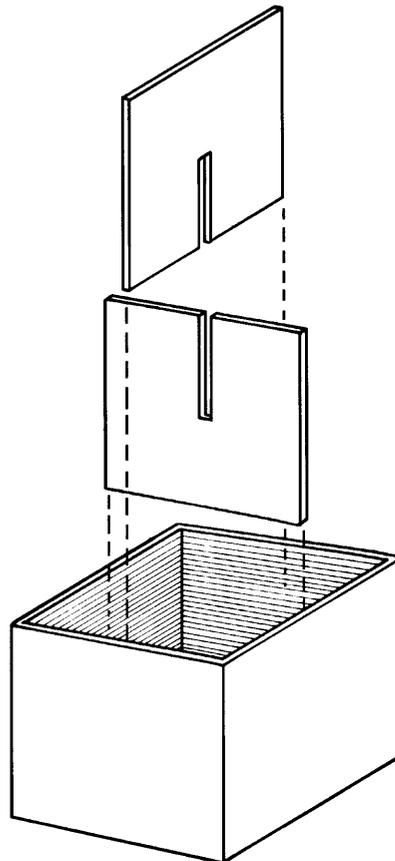
Preparation

1. Obtain one cardboard box for every four students. The box should be approximately 12" x 12" x 18". A box that holds duplicating paper or a box from a grocery store will work well.

Keep the dividers that sometimes come in the boxes. Use the dividers to make four little "rooms" in each box, as illustrated in Figure 15-1.

Figure 15-1

Using dividers in a cardboard house



2. Plan to have students display the wired boxes as part of an exhibit for parents or for other classes after you have completed the unit.

Procedure

1. Tell students that they will be wiring the box as though it were a house. Organize them in teams of four. Have each team choose one person to be the discussion leader and another to do the drawing. Have each team work together to draw a plan for their house wiring.
2. Speaking to the class as a whole, remind the students of the work they have already done designing circuits, looking at the differences between series and parallel circuits, and using switches. Discuss how using series and parallel circuits can affect the brightness of the bulbs.
3. Tell students that their task is to **organize** their house so that there is a light in each room. Draw on the board the simple pattern of the four rooms of the house. Say to them: "When we make a plan for the house, what do we need to decide?"

As students discuss this, write essential questions on the board. Some of those questions are listed below. Feel free to add any others you or the students think are important.

- Where will the lights be placed?
 - Where will the switches be placed?
 - Where will the D-cell batteries be placed?
 - How should the switches, bulbs, and D-cell batteries be connected so that the bulbs burn the brightest?
 - Where will the wires be placed?
4. Remind students that their plans will be easier to read if they use the symbols for the elements of the electric circuits (see Lesson 10). It will also be easier to read the plans if they use a different color pen or pencil for the cardboard walls and for the wiring.
 5. Have students go to work. Circulate around the room, watching and serving as a resource person where needed. By the end of the period, each group should have some version of a plan for the wiring they will do in the next lesson.
 6. Ask students to draw a copy of their wiring plans in their notebooks. These drawings will give them a record and will give you an opportunity to see how each student is doing.
 7. Clean up.

Final Activities



When most students have finished, ask them to share their plans. This will provide an opportunity for an oral presentation, and it will help students who are struggling with their plans to see what others are doing.

Extensions

Some students will benefit from extra time to perfect their plans. Between Lessons 15 and 16, those students should continue working on their plans so they are ready to go to work wiring at the beginning of the next class.

Evaluation

The house plans will provide information about how well students use symbols in their wiring diagrams and about their understanding of circuits.