

Lesson Plans for Light-House Culminating Project

Prior Knowledge:

- Students know the requirements for a circuit (closed, conducting loop & voltage source)
- Students can create circuits with resistors in parallel and series, and can describe how adding additional resistors affects the voltage, current, and effective resistance of that particular circuit configuration
- Students know and can apply Ohm's Law for circuits ($V = IR$)

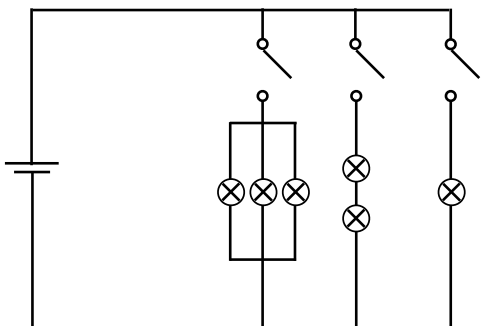
1. Wire Diagram

Objective: Students will create wire diagrams for their electric buildings.

Engage and Explore

1. Students are asked to respond these questions...
 - a. Do you think the electrical appliances in your house/apartment are in series or in parallel with each other? How do you know?
 - b. How do you think electricians know how to correctly install lights and electrical outlets in a building?
2. Teacher provides support (as needed) in guiding students towards creating the correct wire diagram for the electric building (One switch controls a single lamp, one switch controls two lamps in series, and one switch controls three lamps in series, with all three branches in parallel with each other, connected to a 9-V voltage source).
3. Students submit wire diagrams to "The City Inspector" (the teacher) for approval.

One representation of wiring (there are many different ways this can be drawn and still be correct):



2. Switch and Circuit Prototypes

Objective: Students will prototype series and parallel circuit sections and test switches.

Switch Prototype tutorial (Bree Barnett Dreyfus): <http://www.youtube.com/watch?v=o0MDBbH9eGk>

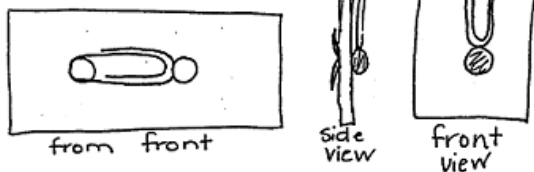
Explain

1. Show examples of circuit diagrams drawn by various students in the class (students will place circuit elements in different locations on their page, and the various branches of the circuit will be arranged differently from student to student), and ask whether these circuits are really the same, even though they don't look identical.
2. Have students create two non-identical looking diagrams of two lamps in parallel
 - a. Ask whether the physical wiring must match the exact "picture" of the wiring diagram, of whether the actual circuit may look slightly different and still function the same as the schematic.

Elaborate

3. Have students create and test the prototypes to ensure that the switches and lights function as intended.
4. Teacher should provide feedback to students as to whether the series and parallel light circuits are constructed correctly.

Switches made from 2
brass brads and one
paperclip



3. Light-House Build & Blueprint

Objective: Students construct light-houses according to circuit requirements, and create blueprints that accurately depict their buildings.

Evaluate

1. Have students brainstorm what they would have in their ultimate “dream house.” They can create a list of themes or desirable features to include. Students should sketch the layout of the structure and the rooms (doors, windows, stairs, etc.).
2. Students are given time in class to acquire materials from the T4T cart and explore potential uses for the various materials.
3. Students create full electric building model.
4. Students create design poster “selling” their house to the public, explaining the purpose of each room and the theme of the entire building. Design poster must include approved circuit diagram and floor plan, front elevation, and side elevation blueprints of the house.

*During all activities teacher serves as a facilitator of student learning (i.e. student centered instruction). Most tasks should be completed by students after simple directions, or facilitated questions to enhance student learning.

**Use of student handouts serves as guidelines for students.

Accommodations

All individual accommodations for students should be met with respect to your particular students and classroom dynamics and will vary from class to class and group to group. Facilitator should always differentiate instruction by providing the necessary blend of guidance and exploration for each student group and their specific needs.