

Paper Circuits- 2D Homes on a Street

PLEASE NOTE- THIS IS A COLLABORATIVE PROJECT.

PREREQUISITES

Students should have already completed the simple and parallel circuit activities, have made a battery holder (press switch), and be comfortable designing circuits without a template.

DESCRIPTION

In this group project, students will make a house and then add paper circuits to light up the artwork. The class will then work together to make a mural using the light up houses.

Please note- this lesson can be scaled up or down by having students design a house freehand or using coloring templates. This lesson will generally take 2 sessions to complete.

LEARNING OBJECTIVES

Students will:

- Design and create or color a house.
- Design and create a parallel circuit without a template.
- Work as a team to make a mural.

STANDARDS USED

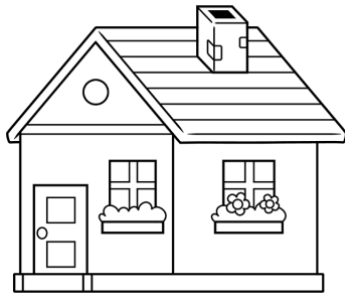
This will be specific to the grade you are teaching. Please check the list at the end of this lesson.

MATERIALS AND SUPPLIES

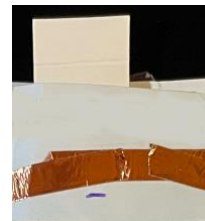
- White paper (or coloring sheets)
- Drawing and coloring tools
- Copper tape
- 3v coin batteries
- Card stock
- Foam tape
- LED lights
- Mural paper
- Construction paper
- Glue sticks

ACTIVITY

1. Based on the abilities of your students, decide if you want them to freehand draw a house or use a coloring sheet. These are some examples of good coloring sheets as they don't have too many details.

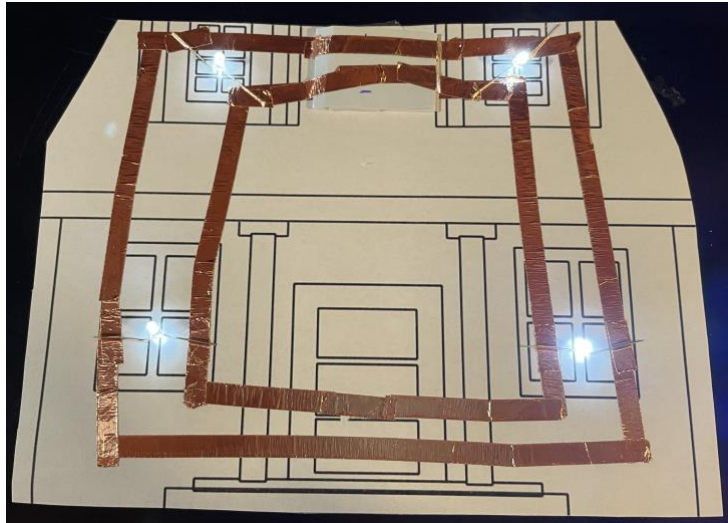


2. If you are using coloring sheets- provide each student 2 copies of their house. One copy will be colored on and the other will be used for the circuit. They will then be glued together. If you are having students freehand draw their house- have them draw in pencil in the first session, then make a copy of each drawing and provide the original and copy back to the student. In the second session, have students color their drawing.
3. After the house is colored, have students cut out BOTH the colored version and the black and white version.
4. Have students decide what they want to light up on the house and mark it on the b&w copy.
5. The battery installation for this project can be done in two ways: 1) Have students make a typical battery holder press switch, or 2) make a battery holder using 1 piece of foam tape at the bottom and side of the battery but leaving the top open (this is instead of using 2 pieces of foam tape around 3 sides the battery like when you make a press button). Insert a small piece of cardstock at the top of the battery between the battery and 1 side of the holder to turn the switch “off”. This can be made into a “chimney” for the house. Have students decide on the placement of the battery “Chimney” and mark the location on the b&w version.



6. On the b&w version, have students design a parallel circuit in pencil using no more than 4 lights. Remind students to stick to the colors that work best on a single circuit (blue + white OR red + yellow OR red + green).

7. After designing the circuit, students should use the copper tape, battery “chimney”, and LEDs to make the circuit. Test the circuit to ensure it works by removing the piece of cardstock from the battery holder.



8. Have students glue the colored house to the b&w circuit page, making sure to line up the lights where they want them before gluing down.



9. Have the students work as a class to decide where each house should be placed on the class street. After houses are glued on, have students add trees and shrubs around their house using construction paper to make it look cohesive.

10. Remove the card stock “chimneys” on all the houses to have them all light up at the same time. Reinsert the “chimneys” to turn the lights off so that batteries don’t drain.



ACCOMMODATIONS FOR INCLUDING ALL CHILDREN

- BE CAUTIOUS ABOUT THE COIN BATTERIES IF YOU HAVE STUDENTS THAT EAT NON-FOOD ITEMS. If you have students that may have issues with the batteries, please provide them in a battery holder and have the teacher or para attach them to the artwork.
- For students who may have a difficult time making a circuit without a template- the teacher can make a circuit template for a house on one page and mark the light locations on the page that will be colored. Students will then use the circuit template to make the circuits.
- Use adapted coloring tools or tools with adaptive grips as needed.
- Consider having students work with a partner/buddy if they are unable to physically do the coloring or create the circuit.
- Use LED stickers instead of bulbs for students with fine motor issues.
- Consider fabric or copper tape based on student’s needs (scissors vs ripping).

- Have paras assist with cutting tape as needed.

Possible Standards

Art Standards

Grade 4:

VA.4.S.1.1

Manipulate tools and materials to achieve diverse effects in personal works of art.

VA.4.S.1.2

Explore and use media, technology, and other art resources to express ideas visually.

VA.4.S.3.1

Experiment with various materials, tools, techniques, and processes to achieve a variety of results in two- and/or three-dimensional artworks.

VA.4.F.1.1

Combine art media with innovative ideas and techniques to create two- and/or three-dimensional works of art.

VA.4.F.1.2

Examine and apply creative solutions to solve an artistic problem.

Grade 5:

VA.5.C.2.1

Revise artwork as a necessary part of the creative process to achieve an artistic goal.

VA.5.S.1.2

Use media, technology, and other resources to inspire personal art-making decisions.

VA.5.S.2.3

Visualize the end product to justify artistic choices of tools, techniques, and processes.

VA.5.S.3.1

Use materials, tools, techniques, and processes to achieve expected results in two- and/or three-dimensional artworks.

VA.5.F.1.1

Examine and experiment with traditional or non-traditional uses of media to apply imaginative techniques in two- and/or three-dimensional artworks.

VA.5.F.3.3

Work collaboratively with others to complete a task in art and show leadership skills.

Grades 6-8:

VA.68.S.2.1

Organize the structural elements of art to achieve artistic goals when producing personal works of art.

VA.68.S.2.2

Create artwork requiring sequentially ordered procedures and specified media to achieve intended results.

VA.68.O.1.3

Combine creative and technical knowledge to produce visually strong works of art.

VA.68.F.1.1

Use non-traditional thinking and various techniques to create two-, three-, and/or four-dimensional artworks.

VA.68.F.1.3

Investigate and describe how technology inspires and affects new applications and adaptations in art.

VA.68.F.3.3

Collaborate with peers to complete an art task and develop leadership skills.

Grades 9-12:

VA.912.S.1.2

Investigate the use of technology and other resources to inspire art-making decisions.

VA.912.S.3.1

Manipulate materials, techniques, and processes through practice and perseverance to create a desired result in two- and/or three-dimensional artworks.

VA.912.F.1.4

Use technological tools to create art with varying effects and outcomes.

Science Standards

Grades 3-5 (Computer Science):

SC.35.CS-CS.1.4

Create a simple model of a system (e.g., flower or solar system) and explain what the model shows and does not show.

SC.35.CS-CS.2.4

Solve real-world problems in science and engineering using computational thinking skills.

Grade 5:

SC.5.P.10.4

Investigate and explain that electrical energy can be transformed into heat, light, and sound energy, as well as the energy of motion.

SC.5.P.11.1

Investigate and illustrate the fact that the flow of electricity requires a closed circuit (a complete loop).

Grade 7:

SC.7.P.11.2

Investigate and describe the transformation of energy from one form to another.