



Electrifying Art



A Maker Project

Electrifying Art was created as an after-school event by AAUW-Auburn, with support from AAUW California and local sponsors: Sugar Plump Fairies, Auburn Host Lions, and the Kiwanis Club. *Electrifying Art* was first presented in collaboration with the Girl Scouts in April 2017. Sandra Scott, Curriculum Designer

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ELECTRIFYING ART

A Maker Project

Overview

The instructional strategies in this lesson combine learning about very basic electricity and electrical circuits concepts with the application of a hands-on art experience. The target audience is early elementary school children (K-3). The lesson can be modified with more complex electricity/circuit lessons for older children. The suggested number of participants should be limited to 50 or less to provide a quality experience.

Presenter/Mentors

One presenter - and one mentor per 6-9 participants

Description

The project is designed to spark girls' (ages 5-8) interest in STEAM (science, technology, engineering, art, and math). Combining art with science, using problem-solving and design thinking, participants generate imaginative sculptures using Play Doh functioning as part of an electrical circuit.

Lessons

- Learning about electricity and how it flows in circuits; and
- Learning how to make Play Doh sculptures that become part of an electrical circuit using a battery holder, LED lights, a buzzer, and a switch to light up art.

Discipline(s)/Subject Area: Science, Engineering, Art/Design

Set-up Time: 1 hour +

Instructional Time: Plan for 1.5 to 2 hours +/- of instructional/maker time

Required Technology: Computer with presentation software and audio/visual display

Instructional Materials

Instructional Materials - Per working group of 3:

- Work space with disposable covering
- 12 AA batteries
- 3 Battery holders with terminals
- 20 LED lightbulbs – various colors
- Switch
- Conductive Play Doh with a color – purchased or home-made
- Insulating Play Doh white only – purchased or home-made
- Various decorative items, buttons, toothpicks, popsicle sticks, empty paper towel rolls, etc.
- Handout demonstrating basic electricity concepts and materials
- PowerPoint presentation

Framing Questions

What is electricity?

How do art and science interact in our world?

Objective

Participants are exposed to simple electricity concepts while having fun.

Learning Outcomes

Participants will demonstrate a foundational understanding of electrical circuit concepts as they:

- Apply a basic electrical circuit model to make a functioning simple circuit; and
- Use design thinking/troubleshooting to problem-solve, as they make imaginative sculptures that light up.

Set-up (1+ hour)

- Work tables
- Kits
- Battery holders
- Art supply table with working models for demonstration
- AV Check
- Distribute equipment and materials on the work tables for groups of three
- Volunteer training/demonstration/chance to try out what participants will do (30 minutes)

Lesson 1 (20 -30 minutes)

Away from the work tables with equipment on them, the whole group gathers for the electricity lesson - and to learn about what they are going to do.

Present PowerPoint Lesson – Part 1: Electricity Can Light Up Art

PowerPoint Presentation Slides 2-17.

2. Ask participants: Did you know that electricity can light up art, and would you like to do that?
3. SAFETY FIRST! Warn participants to always be careful when experimenting with electricity. Never stick wires or other objects into wall outlets. Always do these activities with adult supervision.
4. Encourage participants to describe objects in the room that use electricity. Ask them about things they might not realize use electricity, such as a clock, exit signs, flashlight, etc.
5. Ask participants: What is electricity? Explain that electricity is the flow of electrons in an electrical circuit.
6. Ask participants: Does anyone know what an electron is?
 - a. Show the slide of a helium atom model. (You could have a balloon filled with helium to demonstrate a connection with the atom.)
 - b. Tell participants that atoms are so small you can't see them. The parts of an atom are protons, neutrons, and electrons. A core of protons and neutrons are

- surrounded by orbiting electrons. Protons have a + charge, electrons have a – charge, and neutrons have no charge.
- c. Electrons act as a charge carrier because they have a negative charge. When we free an electron from an atom and force it to move, we create electricity.
7. Ask participants: Does anyone know what an electrical circuit is? Reference the circuit schematic on the PowerPoint.
 - a. A circuit is a continuous path for electricity to flow from a power source (e.g. a battery) through a conductor (e.g. a wire) into a device that uses power (e.g. a light bulb) and back to the power source.
 8. Cycle through slides 8-10 to demonstrate electron movement.
 9. Cycle through slides 8-10 to demonstrate electron movement.
 10. Cycle through slides 8-10 to demonstrate electron movement.
 11. Explain that a conductor is the path electrons flow through. A lamp cord is a conductor. In our case Play Doh and wires will be our conductor. (Play Doh conducts because it has water and salt.)
 12. Cycle through slides 12-15 to demonstrate electron movement.
 13. Cycle through slides 12-15 to demonstrate electron movement.
 14. Cycle through slides 12-15 to demonstrate electron movement.
 15. Cycle through slides 12-15 to demonstrate electron movement.
 16. Show Battery Holder with red and black wires.
 17. Point out that LEDs have a long lead and a short lead – match the short lead to the black wire and the long lead to the red wire.
 18. Let's make a circuit like the one on the slide.

Assign Participants to Workstations

Pause the PowerPoint presentation and assign participants to work tables in groups of three.

Lesson 2 (10 minutes)

PowerPoint Part 2: Hands-on Practice at Workstations

Mentors circulate through the room to help, demonstrate, and answer questions. Mentors act as coaches encouraging participants to “figure it out” without giving them the answer right away.

Slides 19-24

19. Demonstrate, via the PowerPoint and live demonstration, how to make a Play Doh circuit. Make two Play Doh balls with a color.
20. Put battery terminals in the balls.
21. Add an LED – long leg in the ball with the red wire and shorter leg in the ball with the black wire.
22. Demonstrate a “short” on the slide. Note the light will go out or dim. Don't do this!
23. Explain that we need an insulator that does not let electricity easily flow through it. Participants add a white Play Doh insulator to their circuit as shown and try the LED again.
24. Tell participants that they can now create their own Play Doh sculptures and light them up.

Lesson 3: Electric Circuit Maker Exercise (30 minutes)

In work groups of 3, participants design sculptures using provided materials while making simple circuits. Each participant has a battery holder. Encourage them to use their imagination.

Gallery Walk (15 minutes)

Organize a gallery walk around the room. Split the participants in three groups. Group one walks around the “gallery” while the others stand behind their works to demonstrate and answer questions, and then group two and three take their turns. Observers can join the gallery walk.

Close (10 minutes)

- Bring group back together.
- Reinforce how a circuit functions.
- Ask participants: What did you like? What did you learn?

Electrifying Art Budget & Product Source

Expenses Per Group of Three Participants

The table below includes purchased items; tax has not been factored in. Decorative items such as buttons, sequins, feathers, etc. were donated.

EQUIPMENT	PER GROUP
12 AA Batteries	\$4.80
Kit	\$30.00
Switch	
Motor	
Buzzer	
1 Battery Holder	
LEDs 5 each RYGB & White	
2 Extra Battery Holders	\$10.00
Play-Doh 4 PAK-Conductive	\$2.99
Home-made White- Insulating dough	\$1.00
Total Per 3 Person Group	48.79

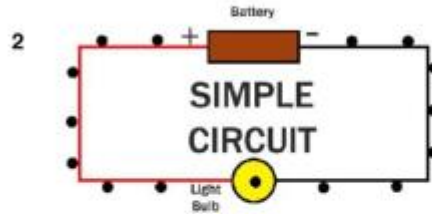
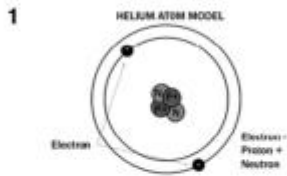
Other Whole Project Expenses

- Rolling pins can be made from PVC piping and cut; 10 feet of ¾” PVC is \$2.65
- Butcher paper to cover tables and provide a drawing space for background pictures is 1000 feet X18” wide @ \$28.07.

Kits and battery holders were sourced from Squishy Circuits: squishycircuits.com
Dough recipes for conductive and insulating dough can be found at their site.

Electrifying Art Handout

LIGHT UP ART



Battery Pack



LED (Light-emitting diode)

MAKE A SIMPLE CIRCUIT

