



Lesson Plan: Revolutionary Circuits

Grade

Grade 3 Social Studies and Science

Topic

Revolutionary Circuits! - The American Revolution and Energy

Enduring Understanding

- People establish governments to provide stability and ensure the protection of their rights as citizens.
- Energy can be transferred from place to place by electric currents. Electric currents flowing through a simple circuit can be used to produce motion, sound, heat or light.

Primary Standards/Indicators

Social Studies

3-3.3 Summarize the course of the American Revolution in South Carolina, including the role of William Jasper and Fort Moultrie; the occupation of Charles Town by the British; the partisan warfare of Thomas Sumter, Andrew Pickens, and Francis Marion; and the battles of Cowpens, Kings Mountain, and Eutaw Springs.

Science

3-3.A.1 Obtain and communicate information to develop models showing how electrical energy can be transformed into other forms of energy.

3-3.A.2 Develop and use models to describe the path of an electric current in a complete simple circuit as it accomplishes a task (such as lighting a bulb or making a sound)

Secondary Standards/Indicators

Social Studies

3-3.2 Compare the perspectives of South Carolinians during the American Revolution, including Patriots, Loyalists, women, enslaved and free Africans, and Native Americans.

Science

3-3.A.3 Analyze and interpret data from observations and investigations to classify different materials as either an insulator or conductor of electricity.

Academic Language

Vocabulary

- Electricity
- Circuit
- Battery
- Electric current
- Insulator
- Conductor
- Closed circuit



Language Function and Content Objectives

- Ask questions about electricity in order to build a simple circuit
- Infer the purpose each material used in paper circuits in order to explain a simple circuit
- Synthesize information about the American Revolution in order to create a “secret” message

Assessment Plan

- Pre-Assessment-
 - Students are asked to complete a Padlet in which they write one sentence about something important from the American Revolution. This can include people, places and events. Students are encouraged to think through everything they have studied and try not to duplicate their classmates ideas.
 - After students have written their ideas, ask them to volunteer to share about a topic that they did not write about. Make corrections as needed but allow students to show what they know and talk about several different ideas in order to activate knowledge.
 - Anticipation Guide - Students should answer each question on the anticipation guide prior to reading the story book.
- Post-Assessment-
 - Students complete the handout to demonstrate understanding or identify areas of confusion about circuits.
 - Finally, they should answer the after portion of the anticipation guide.
- Criteria for Mastery -
 - Student is able to explain the details and importance of one event that occurred during the Revolutionary War.
 - Student is able to build a simple circuit and show the transfer of energy using a light.
 - Student is able to create a model circuit.
 - Student can identify one example of insulator and one example of a conductor.

Materials

- Padlet or Post-Its
- Anticipation guide
- Francis Marion book
- [Energy stick](#)
- Paper circuits
 - Copper tape
 - 3V coin cell batteries
 - Surface mount LEDs
 - Binder clips
 - Model circuit paper (so students can “trace” circuits)
- Paper materials to make letters/cards (cardstock or construction paper)
- Crayons, markers, etc.
- Sample circuits



Teacher Preparation

For this lesson students should be familiar with the concepts of the American Revolution, as this can be used as a review of the material and an intro to the concept of simple circuits. The paper circuits may seem like an intimidating concept but are fairly easy to use. To help alleviate stress, sample circuits have been included in the kit and students will be provided with outlines of the circuit patterns so they know where to place the copper wiring.

It is helpful to have materials set out prior to lesson. The model papers can be helpful so that students can “trace” where to put copper wiring, battery, light, etc.

Meat of Lesson

• Hook

1. Complete the “Before Reading” section of the anticipation guide.
2. Read aloud - Francis Marion and the Legend of the Swamp Fox **(Step 1 can be completed the day before. Additionally, helpful pages have been marked. You may choose to read only these pages.)**
 - a. How did Francis Marion work to defeat the British?
 - b. Were there other ways to help fight? Not all people fought in battle. Can you think of other ways people helped during the war?
 - i. Allow students to list different answers then explain that some were spies who helped the Continental Army by creating and passing messages.
3. Explain directions-
 - a. “Today you will be travelling back in time to 1780 when the British invaded South Carolina. The patriot militias are fighting back but they need your help! Support the cause of liberty by serving as a spy for the leaders of the American resistance. You must figure out a way to share your message without letting the British know.”
4. Ask students to get up and stand in a circle. Tell students we will make our spy notes using something very special. Introduce the energy stick by having students hold hands and having one hold one end (silver ring) while the person next to them holds the other.
 - a. The stick should light up and sound if all students are touching.
 - b. Have two students break the chain. Ask them to make predictions about why it does not work if everyone is not touching.
 - i. Explain that this is an example of an electric circuit and in order for the electricity to work, the circuit must be completed.
5. **NOTE** - During the Revolution, people **did not** have access to electricity like we do today. For our notes, we will be able to use electricity since we are travelling back in time. This would not have been possible during the American Revolution.

• Brainstorm

- Students will have time to look at the [sample circuits](#) and select one of the options. (Included in kit)
- Next, they will create a message. This can be about an upcoming battle, a battle they’ve already studied or a famous person during the war.
- Once they’ve selected their model circuit and come up with their message, they should sketch out the full idea.



- Using the anticipation guide, they should draw their sketch on the bottom of the page.
 - The instructor should encourage them to be creative in how they attempt to hide the message. “Can you make the message look like something else?”
- **Prototype**
 - Students will work independently to create their circuits but should be encouraged to help each other.
 - Each will receive the model paper, light and copper wiring. They will connect these materials.
 - After they’ve done this, they will create their message and add decorations to their note. They may cut, paste, draw, etc.
 - Once they’ve completed their design, students will attach the battery using the binder clip. Again, they should look at the sample circuits to help them see how to do this.
 - Students that struggle with this should be encouraged to work with students that have successfully completed their circuit.
 - Once students have put all of the pieces together, they should test their secret message. Does the object work? Does the light go on? Is there some sort of hidden message? How can it be improved?
 - Instructor should be asking these questions of groups. If anyone finishes early, ask them how they can improve their message.
- **Share**
 - Students show off their secret notes. Ask them to talk about what topic they chose to write about and how they tried to hide it. (Can be done as a whole class or in table groups)
 - Instructor asks for feedback- What went well? What made this challenging?
- **Synthesize**
 - At this time students should be brought back together in a whole group. The instructor will lead a discussion of what was needed for the light to go on. See *discussion guide*.
 - Students should complete the post assessment and after reading on the anticipation guide.

Supports for Student Learning

Accommodations

- **ELs**- Provide labels and written directions for each of the steps. The instructor can also use props to further help students understand major concepts and instructions. Due to the visual and hands-on nature of this lesson, there is little written work but students may use images instead of complete sentences when creating their messages.
- **Grade Level adaptation**- Stencils are provided and groups can be teacher selected to scaffold for those that need more support. Definitions can be introduced and practiced ahead of time. Those that need help writing or explaining their note can substitute words for images and can be paired with other students to develop a script.



- **Advanced students**- Those students who are able to grasp these concepts quickly will be asked to incorporate more intricate circuits in their message, including adding switches. They will use these to examine how to better control the circuit and make their message more interactive through the use of one or multiple switches.
- **Additional supports**- As needed.

Discussion Guide

Synthesis

- Ask students, “What went well and what was difficult about making the secret messages?” Allow them to share their answers and see if any talk about how they adapted their messages.
- Your light would not go on until you added the battery. This was held in place with the binder clip. What job does the battery do? (*Provides power to the circuit.*) Do you think you could use something other than the binder clip? (*Yes, this is just a way to hold the battery in place.*)
- Why did we use copper tape in our message? Do you think string or ribbon would have worked just as well? (*No, ribbon or string would not work as well. These are examples of **insulators**. Copper foil is made of copper metal, which is a great material to **conduct** electricity.*)
 - If time, you can test this with the students.
- Did the circuit work when the foil wasn’t touching other foil or the LED light? Can you predict why? (*Think back to what happened when we weren’t holding hands with the energy stick! If the pieces do not all touch, the electricity cannot flow all the way through and the circuit is broken.*)
- What happened if you did not leave a gap for the LED light and ran the copper foil through it? Can anyone predict why? (*The light did not shine. If there is no break, the electricity will “skip” the light and continue to run through the foil. This is known as a short circuit.*)
- What do you think the plus (+) and minus (-) signs mean? Why do you think they need to match in order to make your circuit work? (*These show positive and negative charges. If they do not match, the circuit will not work.*)

More to Explore (Resources)

<https://tinkering.exploratorium.edu/paper-circuits>

https://www.teachengineering.org/lessons/view/cub_energy2_lesson01

<https://learning-in-action.williams.edu/opportunities/elementary-outreach/science-lessons/4th-grade-energy-unit/>

