

## Lesson Seven

### Complete Circuits and Formative Assessment

**Grade:** Fourth Grade

**Time:** 60 Minutes (w/small group accommodations)

**Materials:** Based on a class size of 25 each student will need two wire segments with alligator clips on at least one end of each wire. The other end must be stripped if it does not have an alligator clip at each end. Each student will need one battery holder and one D- cell battery. Each student will also need one light bulb socket as well as a light bulb.

**Objective:** Students will gain further knowledge of circuits as well as familiarize themselves with using new and actual science materials such as battery holders, wire, bulbs, and sockets.

**Standards:** NYS/National Standards

**New York State Standards:** Standard One: Analysis, inquiry, and design.

- Scientific Inquiry: Key Idea One, The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing creative process. **S1.1** Ask “why” questions in attempts to seek greater understanding concerning objects and events they have observed and heard about. **S1.1a** Observe and discuss objects and events and record observations. **S1.3** Develop relationships among observations to construct descriptions of objects and events and to form their own tentative explanations of what they have observed. **S1.3a** Clearly expresses a tentative explanation or description, which can be tested.
- Key Idea 3: Observations made while testing proposed explanations, when analyzed using conventional and invented methods, provide new insights into phenomena. **S3.2** Interpret organized observations and measurements, recognizing simple patterns, sequences, and relationships. **S3.2a**, state orally and in writing, any inferences or generalizations indicated by the data collected.

#### National Standards:

##### NS.K-4.2 Physical Science

- As a result of the activities in grades K-4, all students should develop an understanding of the following: properties of objects and materials, position and motion of objects, and light, heat, electricity, and magnetism. Utilized to build an electrical circuit as well as being able to understand electricity and its path traveled.

##### NS.K-4.1 Science Inquiry

- As a result of the activities in grades K-4, all students should develop abilities necessary to do scientific inquiry, and understanding about scientific inquiry.

## **Lesson Seven (cont.)**

### **Procedure:**

- 1.) The teacher will be sure that each student already has the science materials placed at their work area prior to the lesson beginning. The teacher will describe and state what each item is at the students work area. The teacher will also be sure that these items are listed on the board for students to refer to in future discussions. Encourage students to use the proper terms as scientists and to not forget to use previous words such as circuits/ path/ electricity/current...etc.
- 2.) The teacher will then explain to students that they are going to make actual circuits with real science materials, and that it is important to familiarize ourselves with these items because they will be using them for future experiments.
- 3.) The teacher will have the written directions for assembling the circuit materials posted in the front of the room as well as orally stating each direction and modeling explicitly the assembly to the class. The teacher gives wait time and assists any student having difficulty in the step by step process.

### **Directions:**

- Squeeze the Fahnestock clip on one end of the battery holder, while doing this slide the stripped end of the wire in, and release. The wire will be crimped in the clip (holding it)
  - The first step is to be repeated using the other wire on the other side of the battery holder.
  - Take the alligator clip at the end of one wire and clip it in the same fashion to the Fahnestock clip on the socket.
  - Do the exact same thing as the previous step with the other wire on the other clip on the socket.
  - Insert the power source, in this case being the D cell battery.
  - Last, screw your miniature bulb in using a rightward turn.
- 4.) Now allow students to observe the closed circuit (complete), the bulb will be lit.
  - 5.) Formative Assessment: The teacher will be assessing students' progress with circuits based on their ability to work with materials, follow guided directions and modeling, as well as following the science rules. The teacher can observe this amongst the class, change seating, present in small group, and pull out individual students for support.

### **Conclusion:**

The teacher concludes this lesson with a class discussion. It is important that the teacher has students discuss the similarities all of their circuits have in common. Students should be able to infer what would happen if an alligator clip was disconnected. The students should discuss the overall shape or path of the circuit. The students should identify that it closed not open. The teacher can use a student model to disconnect and show physical representation of open (incomplete) circuits by disconnecting the clips, and alligator clips at different segments. The teacher can also combine two circuits with the alligator clips to create a larger, multi bulb, yet closed circuit.

It is also important that the teacher continues pulling specific words from the specialty vocabulary being used in this science unit and records new words as well as previous learned words on a word list for the class to view or word wall. This will be done in the conclusion of the lessons and throughout the unit.