

Simple Circuits

5th Grade

Natalie Anderson

Benchmark:

SLC 9: Students will explore the transformation of energy within living and physical systems.

Objectives:

Students will be able to explain a simple circuit and know when a circuit is considered opened or closed.

Materials:

- Electric Motors
- D-cells, alkaline
- Circuit bases
- Switches
- (4) 20 gauge wires (approx. 30cm long) per group
- Light bulbs
- Light bulb bases

Initial Demonstration:

Break the class up into groups. Give each group a light bulb, 2 pieces of wire, and a D-cell battery. Ask the students to figure out how to get the light bulb to light up. Why did this work? How can we think of electricity working?

Target Observations:

- Different pieces of wire must touch the two ends of the battery
- One piece of wire should touch the screw-like side of the bulb, and the other piece of wire should touch the bottom of the bulb

Target Model:

-Electricity is like water: it flows.

-There is only one way to get the light bulb to light up.

Discussion:

If electricity is like water then the wires are probably like the hoses. But what happens if you shoot water from a hose at a wall? It just splashes right off. You need the water to go through another hose or pipe if you want it to go anywhere. With electricity, however, some pipes push out electricity, while others pull it in. Where are these “in” and “out” spots on the battery? Where do you think they are on the bulb? If you don’t connect up to these “in” and “out” spots, do you think the electricity will flow? What do you think the battery does?

Target Observations:

- If you shoot water at a wall, it just splashes right off.
- The “in” and “out” on the battery are the ends of the battery
- The “in” and “out” on the bulb are the end and screw parts of the bulb
- If you don’t hook up the battery, the light bulb won’t light

Target Model:

-Electricity is like water: it flows.

-The battery pushes the electricity so that it flows.

-There is only one way to get the light bulb to light up.

-In order to get electricity to flow, you have to let it go into the inputs and outputs of the stuff it’s supposed to flow through.

Procedure:

Using this “flow” method, try and make a circuit with the electric motor. Show the students how to place a piece of tape on the shaft of the motor so it is obvious when it is spinning. Where are the inputs and outputs of the motor? What is different about this from the bulb? Make a drawing of your setup when the motor is spinning. What is the general shape that the connection makes?

Target Observations:

- The input and output for the motor are the ends that are sticking out.
- The input and output for the motor are more obvious than the bulb.
- The shape that the connection makes is a circle.

Target Model:

-Electricity is like water: it flows.

-The battery pushes the electricity so that it flows.

-There is only one way to get the light bulb to light up.

-In order to get electricity to flow, you have to let it go into the inputs and outputs of the stuff it’s supposed to flow through.

-The electricity must flow in a circle, called a circuit.

Procedure:

Give the groups a switch this time, and ask them to figure out what the switch does when used with the light. Why would you want to use it? Is there anything like it in the classroom? If electricity flows like water, what does the switch do to that flow?

Target Observations:

- The switch has an input and output
- When the switch is up, the light does not light up
- When the switch is down, the light is lit
- The switch can be used to turn things on and off
- The lights in the classroom use a switch

Target Model:

- Electricity is like water: it flows.
- The battery pushes the electricity so that it flows.
- There is only one way to get the light bulb to light up.
- In order to get electricity to flow, you have to let it go into the inputs and outputs of the stuff it's supposed to flow through.
- The electricity must flow in a circle, called a circuit.
- A switch can be used to turn things on and off. It stops the flow of electricity.*

Discussion:

As mentioned before, a connection through which electricity could flow is called a circuit, similar to a circle (notice that both start with "cir"). An "Open Circuit" is one where the switch is open, electricity does not flow, and the light does not light up. A "Closed Circuit" is one where the switch is closed, electricity is flowing, and the light is lit up.