

Series Circuit and Switches

Lesson Concept	A series circuit is a simple circuit. If one light bulb goes out in a series circuit, all bulbs will go out because the only path for electricity to travel has been interrupted. Switches open and close circuits. Schematics provide information about circuits.
Link	In the previous lesson students learned a simple circuit is a single path by which electricity can travel. In this lesson students learn about adding a switch to a simple circuit, a series circuit, and how to read and draw schematics.
Time	75 minutes
Materials	<p><u>Whole class</u></p> <p>21.5 Volt bulbs 2 Bulb holders 1 D-Cell 1 Battery holder (optional) 4 Insulated wires stripped on the ends or 4 wires with alligator clips attached to the ends 1 Switch</p> <p><u>Per Group (groups of 2)</u></p> <p>2 1.5 Bolt bulbs 2 Bulb holders 1 D-Cell 1 Battery holder (optional) 4 Insulated wires stripped on the ends or 4 wires with alligator clips attached to the ends 1 Switch (see below) A series circuit is a simple circuit. If one light bulb goes out in a series circuit, all bulbs will go out because the only path for electricity to travel has been interrupted.</p> <p>1 Plastic zip-top bag</p> <p><u>Individual</u></p> <p>3"x5" Copy of a simple circuit schematic Science Notebook Glue stick Pencil</p>

Advance

Preparation

1. Prepare a demonstration set-up of simple circuit and a series circuit, both with switches.
2. Make a switch. Use 2 brass fasteners, 1 index card, and paperclip. Use a hole punch to punch two holes in the index card, about 1" apart. Put a brass paper fastener through the paper clip and then through one of the holes in the index card. Put the other fastener through the other hole. The paper clip is the blade of the switch.
3. Place all the materials for groups of 2 put into a plastic zip-top bag.
4. Prepare copies.

Procedure:

Engage (10 minutes) *A switch is used to open and close a circuit.*

1. Ask students what they use at home to turn lights on or off. [Expected Student Response (ESR): "You need a switch to turn lights/electricity off and on." Tell students that today they will add a switch to their simple circuit.

Explore (25 minutes) *A switch is used to open and close circuit.*

2. Hold up the switch. Tell students this is a switch made out of 2 brass fasteners, paper clip and an index card. Demonstrate how to wire the switch into the simple circuit.
3. Distribute materials to make a simple circuit. Have students wire a switch into their simple circuit. Allow time for students to investigate how the switch opens and closes the circuit.
4. Ask students to notice the type of material used to make the switch. ESR: The switch is made from metal. Ask, "Why is it important for the switch to have metal parts" ESR: When the switch is closed the metal allows the flow of electricity. Metal is a conductor. When the switch is open the circuit does not allow the flow of electricity.
5. Have students illustrate their simple circuit and the switch in their Science Notebooks.
6. Display and distribute the **Simple Circuit Schematic**. Explain to students that electricians use a schematic to show parts of a system. The symbols. Represent the D-Cell, light bulb, wires and switch. Have students compare their drawing of a simple circuit with a switch to the schematic.

Explore **(20 minutes) A series circuit is a simple circuit. If one light bulb goes out in a series circuit, all bulbs will go out because the only path for electricity to travel has been interrupted.**

7. Have students add another light bulb and bulb holder to their simple circuit. Explain to students that they have now made a series circuit.
8. Ask student to predict what will happen if one light bulb is unscrewed from its holder. ESR: Both lights will go out. The remaining light will stay lit.

Explain **(10 minutes) A series circuit is a simple circuit. If one light bulb goes out in a series circuit, all bulbs will go out because the only path for electricity to travel has been interrupted.**

9. Have students explain in their notebooks why both lights go out in series circuit when one light bulb is unscrewed. ESR: The electricity has only one path to follow. When one light bulb is unscrewed, the path for the electricity is interrupted and the other bulb goes out.

Extend/Evaluate **(10 minutes) A series circuit can also be illustrated as a schematic.**

10. Have students refer to their simple circuit schematic. Have students draw a schematic in their science notebook to illustrate their series circuit. The schematic should have 2 light bulbs, a D-Cell, wire, and a switch.

Simple Circuit Schematic

