

Connect the Circuit Game

INTRODUCTION

Electricity can flow through a complete, closed circuit, but cannot flow through an open circuit. This concept is reinforced with a fun game that tests the steadiness and patience of the players while illustrating this basic fact.

MATERIALS

Bare wire or metal clothes hanger
Light bulb
Light bulb holder
2 batteries
2 battery holders
2 alligator clips
Insulated wire
Cardboard
Tape
Clay (if using the clothes hanger)
Steel Wool (if using the clothes hanger)

WHAT TO DO

1. If using bare wire, cut a piece approximately two feet long and wrap each end around one finger a three or four times to make a loose coil. Cut an 8 ½ by 11 inch piece of cardboard. Attach the wire to the cardboard by taping each of the coils down to opposite ends of the cardboard sheet. The wire should stand up in sort of a U shape. Bend the wire so it looks like a wavy, squiggly line sticking up a few inches from the cardboard.
2. If using a wire coat hanger, first use steel wool to remove any coating from the metal. Do this outside and avoid breathing the material that is being removed. Untwist the hanger and bend it into a U shape. Stick either end of the U into a lump of modeling clay, and then stand the U upside down with the clay as the base. Bend the hanger so it looks like a wavy, squiggly line.
3. Connect the two batteries by clipping their holders together, and attach an alligator clip to each end of this battery pack. Attach one of the alligator clips to the wavy wire near the base of one side.
4. Cut a six-inch piece of insulated wire and strip one end ½ inch and the other 1-½ inch. Connect the shorter stripped end to the other alligator clip. The longer stripped end should be loosely wrapped around the wavy wire to form a loop.
5. When the loop touches the wavy wire it completes the circuit and lights the bulb. The object of the game is to use the loop to trace the entire length of the wavy wire without touching them together and without completing the circuit. If the entire length of the wire can be traced without making the bulb light up then the game has been won!

QUESTIONS TO ASK STUDENTS

1. Why does the light bulb light when the loop touches the wire?
2. Does the game still work with one battery instead of two? What difference would it make?
3. Can you think of any other games or toys that also use open and closed circuits to decide who wins and who loses?
4. Invent a new game that uses open and closed circuits. How would it work?
5. Would the game still work if the loop were made of insulated rather than bare wire? Why or why not?

SUMMARY

The game is based on the fact that electricity flows through closed circuits, not open circuits. The circuit is open when the loop is not touching the wavy wire, so the bulb is not lit because no electricity is flowing through it. When the loop does touch the wavy wire, it completes the circuit, giving the electricity a continuous path to travel; the light bulb lights and the game is lost. The game requires good hand-eye coordination, and should help build an understanding of electrical circuits.

SOURCES

“Awesome Experiments in Electricity and Magnetism.” Michael DiSpezio, Sterling Publishing Co.: New York, 1998, p. 94

“Edison Etc.” The Wild Goose Company: Salt Lake City, 1994, p. 60