

Circuits, Conductors and Insulators

Objective:

Students will understand simple circuits and what type of materials are conductors and insulators of electricity.

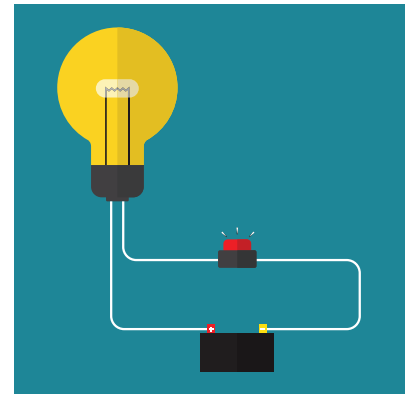
Materials and Curriculum
Correlations ▼

► Introduction

Materials that allow electric current or heat to pass through more easily than others are called conductors; aluminum, silver and copper are examples.

Insulators block the flow of current or heat. Non-metallic materials, such as rubber, plastic, wood, cloth, glass and dry air are insulators. Electric current, which is the amount of electrons passing a given point in one second, is measured in Amperes. Voltage is a measure of potential difference or the electromotive force needed to move electrons through a conductor.

An electrical circuit is a complete path that an electric current travels through. When the circuit is open, the path is broken and no electricity can flow. This is how a light switch works, it opens and closes the circuit. When the switch is off, the electrical pathway is not complete so no electricity can flow. When you flip a light switch, you close the circuit and the light turns on.



Procedure

The energy stick has a small battery, in which energy is stored. It also has a light bulb inside and wires that end in two metal contacts.

1. Touch both metal contacts as a demonstration to complete a circuit to let the electricity flow. Demonstrate what the energy stick does (lights up and makes noise).
2. Have a volunteer hold one of the metal contacts on the stick. Touch the other contact and then touch hands to complete the circuit. (The stick will send an electric current around the human circuit, resulting in light and sound coming from the stick.)
3. Involve a group in making circuits.
4. Direct students into one or more circles.
5. Each circle should have no more than 25 students, plus one adult with an energy stick.
6. Link hands (or knuckle bump for those who do not want to hold hands) to make a complete path with all the students. Have two people stop touching and see what happens.
7. Demonstrate what happens when two people let go. (The circuit is open)

8. Demonstrate that some materials allow electricity to flow through them (conductors) and others resist the flow of electricity (insulators).
Have two people in the circuit hold the ends of a piece of paper. Ask why the energy stick is not working? (The circuit is open because the paper is an insulator.)

Have two people in the circuit hold the ends of a piece of aluminum foil. Ask why the energy stick is working now. (The circuit is closed because the foil is a conductor.)
Have students experiment with different materials from the classroom to discover what are conductors or insulators of electricity.

Safety message: This experiment is safe because this energy stick is designed not to hurt us. Do not play with electrical circuits other than the demonstration energy stick.

Materials Needed:

- Energy stick
- Aluminum foil
- Paper

Curriculum Correlations

K-ESS2 - 2
K-ESS3 - 3
K-ETS1 - 1
1-ETS1 - 1
2-PS1 - 4
2-ETS1 - 1
3-ETS1 - 1
3-ETS1 - 2

4-PS3 - 2
4-PS3 - 4
4-ESS3 - 1
4-ETS1 - 1
4-ETS1 - 2
5-ETS1 - 1
5-ETS1 - 2
MS-PS3 - 3

MS-PS3.B
MS-LS2 - 1
MS-ESS3.A
MS-ETS1 - 1
HS-PS3 - 3
HS-PS3 - 5
HS-ETS1 - 3

