

# Making Fuses



**Electricity All Around Us**  
**Activity**  
**Grade Level: 5-8**

## Main Objectives

The activity will be applied to demonstrate the function of fuses. Learners will be able to manipulate materials and construct a working fuse. They will be asked to record their observations and determine whether they would change any of the designed features.

## Learning Outcomes

By the end of this activity, learners will:

- Identify safety features of fuses
- Choose appropriate materials to construct a fuse
- Record observations about how the fuse functions
- Identify ways to improve the fuse design

## Length of Activity

1.5 hours

## Materials List

Making Fuses Learner Activity Instructions  
 Making Fuses Learner Worksheet

For each learner group:

5 Insulated copper wires (each is 10 to 20 cm long, ends stripped OR insulated copper wires with alligator clips on the ends. These can be purchased at Radio Shack in packs and are reasonably priced.)

- 1 Bulb
- 1 Bulb holder
- Steel wool
- 3 D Batteries

3 D Battery holders

Scissors

Tape

## Background

Fuses are important when we use electricity. Like insulators, fuses keep us safe from electricity. A fuse is designed to shut down circuits or appliances that are overloaded or overheated and to also shut down circuits if there is a short circuit. A fuse is a strip of metal in a glass-like tube that melts if it gets overheated or if there is too much electricity flowing through it. When the metal in the fuse melts, it opens the circuit, thus shutting it off. When fuses burn out, they need to be replaced with a new fuse.

In most homes, fuses have been replaced by circuit breakers. Circuit breakers complete the same function as fuses, with one difference: they do not need to be replaced after the circuit is broken. They can simply be reset or turned back on. If the circuit breaker trips repeatedly, do not try to turn it on again because there is a problem with the circuit. An electrician should be called to repair the circuit. A short-circuit in an electrical system means that the electricity has found a shortcut. Remember that electricity will always find the easiest path to the ground. Short-circuits can happen when the wire to an appliance is damaged, or if there is some kind of damage in the appliance itself. A short-circuit is a safety hazard. When there is a short in a circuit, an appliance or machine can heat up, possibly causing a fire. Fuses help keep us safe from short-circuit fires.

## Procedure

1. Print and distribute the worksheet. Have learners review the background information.
2. Discuss the purpose of fuses and their importance for safety reasons. Ask learners why fuses are needed. Ask the learners if they have ever seen a fuse box or circuit breaker box in their homes.
3. Explain to the learners that they will be making their own fuse.
4. Learners will use the materials and background information to design their fuse.
5. Divide learners into small groups and distribute the materials.
6. Have the learners complete the activity and record their observations on a worksheet.
7. At the end of class, ask learners to share their observations.

## Tips and Extensions

Ask the custodian to show the electrical service panel in the school's utility room. The service panel will be equipped with many circuit breakers. A circuit breaker is another way to keep home appliances from heating up. Discuss how the breaker differs from the fuse.

For a homework activity, have learners ask their guardians to show them the circuit breaker box in their home.

In newer homes, bathroom electrical outlets must have Ground Fault Circuit Interrupters (GFCIs – the ones with test and reset buttons). They have a built-in circuit breaker. GFCIs are much more sensitive than circuit breakers. Why is this design feature important?

## Comprehension

You may wish to test learners' comprehension of the basics of fuses using the following questions:

- Ask learners to explain the process of their fuses operation.
- Would they change the design?
- Why are fuses important?
- Where are fuses/circuit breakers used?
- What is a short-circuit?