

**teacher guide**

**Electrical circuits 5:**

**Measuring electricity**

# Components

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|  | NAME | DESCRIPTION | AUDIENCE |
|  | *Measuring electricity*  teachers guide | This guide describes a simple experiment that demonstrates how fuses work. It includes a summary of common electrical safety devices found around the home. | teachers |
|  | *Electrical units*  fact sheet | Charge, current, voltage, power, resistance and energy are described in this series of fact sheets. Worked calculations and focus questions are included. | students |
|  | *Electrical safety*  worksheet | Students answer questions about earthing and safety in household electrical circuits. | students |

Purpose

Students **Explain** how safety devices and procedures can be put in place to reduce electrical accidents.

# Activity summary

Outcomes

Students:

* perform a procedure to demonstrate the effect of a short circuit in an electrical circuit;
* understand that a fuse is a safety device in a circuit designed to prevent electrical accidents;
* describe safety devices typically used in domestic electrical systems; and
* understand that adequate earthing of appliances prevents serious electrical accidents.
* understand the terms: charge, current, voltage, power, resistance and energy

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| ACTIVITY POSSIBLE STRATEGY | |
| Students perform an activity that demonstrates how a fuse protects a circuit. See ‘Fuse experiment’ below. | students work in small groups |
| Students read the fact sheets, *Electrical units*. Focus question on these fact sheets may be used for class discussion or set as assigments. | individually, small group or class as a whole |
| Students complete the worksheet, *Electrical safety*, as a follow up to the experiment. | individual |

# Fuse experiment

This is a small group practical activity to demonstrate how a fuse protects a circuit when a large current is permitted to flow (short circuit).

A simple circuit using a 12 V transformer, low current fuse wire, lamp and leads with some wires bare, can be short circuited using a screwdriver or similar conductor. Use protective mats under the fuse wire to prevent damage to bench tops.

Note: Students may be temporarily alarmed by the spark produced when the fuse wire melts.

bare wire fuse

12 V



bare wire

screwdriver





# Associated SPICE resources

*Electrical circuits 5: Measuring electricity* may be used with related SPICE resources to address the broader topic of electricity.

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| DESCRIPTION | LEARNING PURPOSE |
| *Electrical circuits (sequence overview)*  This learning pathway shows how a number of SPICE resources can be combined to teach the topic of electricity. |  |
| *Electrical circuits 1: Lightning*  Students are engaged in the topic of electricity through observing and exploring lightning. | **Engage** |
| *Electrical circuits 2: Static electricity*  Students explore the effects of charge through a series of laboratory experiments. | **Explore 1** |
| *Electrical circuits 3: Current electricity*  Students construct circuits using simple electrical components. | **Explore 2** |
| *Electrical circuits 4: Circuit rules*  Students use an interactive learning object to record observations and derive rules for circuits. | **Explain 1** |
| *Electrical circuits 5: Measuring electricity*  Models and analogies are introduced to help students understand concepts around properties of electricity and how it is quantified. | **Explain 2** |
| *Electrical circuits 6: Bioelectricity*  Four fact sheets and a video provide examples of how electricity is used in living organisms, including humans. | **Elaborate** |