**teacher guide**

**Electrical circuits 3:**

**Current electricity**

# Components

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|  | NAME | DESCRIPTION | AUDIENCE |
|  | *Current electricity*  teacher guide | This guide suggests alternative ways that students can experiment with simple circuits. | teachers |
|  | *Models and misconceptions*  background sheet | Eight models that teachers may use to help explain concepts in electricity are described. A list of common misconceptions about electricity, held by students, is included. | teachers |
|  | *Simple circuits*  worksheet | Students explore simple circuits by completing open-ended and structured experiments to explore current, resistance and potential difference. | students |

Purpose

To **Explore** concepts of current, resistance and potential difference.

# Activity summary

Outcomes

Students:

* construct simple circuits from components following circuit diagrams or verbal instructions;
* draw circuit diagrams to represent simple electrical setups;
* explore relationships between current size and position current is measured in a circuit;
* use ammeters and multimeters to measure current and resistance; and
* investigate the total resistance when resistors are connected in series and in parallel.

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| ACTIVITY | POSSIBLE STRATEGY |
| Students explore simple circuits either using procedures described in this guide, or in the worksheet, *Simple circuits*.  Simple circuits can be connected using standard laboratory components: power pack, lamps, meters, switches, cells and wires. Resistances can be measured using multimeters. | small groups or individuals |

# Teacher notes

Procedures may be open-ended with students experimenting with different combinations of components to develop confidence in using equipment. If a more structured approach is required then teachers may direct groups to connect components so a specific outcome is achieved. For example an instruction may be: ‘Produce a circuit

in which two lamps can be switched on and off independently.’

These experiments are written up in many different laboratory manuals in a more structured way.

Teachers may prefer to use these sources instead of the more open-ended approach.

Circuit diagrams may be drawn to represent circuits students construct.

A structured worksheet is included for teachers who prefer to approach the concepts more traditionally.

A large quantity of components is required if students work in small groups to construct a wide variety of circuits. If power packs are used as power sources, 12 V lamps will eliminate accidental ‘blowing’ of bulbs.

Commercially designed kits of components, which may be available in some schools, assist distribution of equipment to students.

# Technical requirements

The guide, background sheet and worksheet require Adobe Reader (version 5 or later). This is a free download from [www.adobe.com.](http://www.adobe.com/) The worksheet is also available in Microsoft Word format.

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Centre for Learning Technology (M016) The University of Western Australia

35 Stirling Highway

Crawley WA 6009

# Associated SPICE resources

*Electrical circuits 3: Current 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*  Six measurements that relate to electricity are explained and related to electrical safety: charge, current, electric potential, resistance, power and energy. | **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** |