Electricity

Expected prior learning

- Be able to identify common appliances that run on electricity.
- Construct simple series electrical circuits.
- Consider whether or not a lamp will light in a simple series circuit.
- Use switches that open and close circuits.
- Recognise some common conductors and insulators.
- Associate metals with being good conductors.

Overview of progression

By the end of this chapter children should have learned:

- to use a wider range of electrical components
- to make changes to electric circuits to compare how they operate
- to identify changes in the output of components through changing the number of cells and position of switches
- how voltage is important in operating different components
- to compare and contrast battery-operated devices with mains power.

Creative context

- This chapter provides a link with the design and technology curriculum, where children design switches to operate under different circumstances.
- There are also clear links with the art curriculum, looking at how symbols can be used rather than drawings to represent electric circuits.

Background knowledge

Batteries supply the energy for current to flow through a circuit. A battery creates a *potential difference* – a difference in electric potential energy – between its terminals. The *volt* is the unit of electric potential. In a circuit this potential difference causes charged particles – electrons – to flow. This is the current. The higher the battery's voltage, the greater the current. A thin wire, like the filament of a bulb, makes it more difficult for electrons to move – it provides *resistance*, which in turn creates heat. In a circuit with a high enough current, the filament will glow white hot, lighting the bulb brightly. If more bulbs are added resistance increases, current falls and each bulb is less bright.

Speaking scientifically

- A *circuit* is formed when the two *terminals* of a *battery* or *cell* are connected by *conductors*. A *current* flows through *components* such as *bulbs*, *motors* and *buzzers*. These convert *electrical energy* into *light*, *heat*, *movement* or *sound*.

Preparation

This topic has many practical elements; the wider the variety of batteries, bulbs and other components available the better. However, it is essential that the voltage labelling on the components is known in order to match to the numbers of batteries required to make the component operate correctly. For example, a motor labelled 3–4V will move slowly when connected to two D-type cells but at high speed with 3 D-type cells.

You will need to provide: Magnifying glasses; batteries (including flat ones); wires; push, two-way and rocker switches; bulbs; 3–4V motors; buzzers; bulbs; crocodile clips (ensure components are matched to the battery voltages used); torches; clothes pegs; split-pin fasteners; paper clips; cardboard; film canisters; marbles/ball-bearings; aluminium foil; 1m nichrome resistance wire; copper wire; chalk; two large plastic bowls; modelling clay; red, green and orange translucent paper; pictures of furnished rooms; secondary sources of information; presentation software; small whiteboards.

On the CD-ROM you will find: Media resource 'The dangers of electricity'; interactive activities 'Circuit diagrams', 'Wires', 'Batteries'