Need to know

Electricity (4E)

Teacher information

This is intended as useful background knowledge for a teacher addressing this block. Please scroll to the end for key knowledge and concepts for children

What is electricity?

Electricity is the most versatile of all forms of energy. It can provide energy to make light bulbs glow and electric heaters warm and can generate the sound in a radio and power anything from computers to motors. **Static electricity** is produced when two things rub together – ice crystals in a cloud to produce lightning, or a comb through dry hair. The electrons, which are tiny, negatively charged particles, are knocked off the atoms in one substance and stick to the atoms in the other. Static electricity does not move, or at most it makes a single jump. Electrical charge made to move in a continuous stream or 'current' is much more useful. **Current electricity** is the movement of electrons in a material. In any material that conducts electricity well, each atom has electrons which are loosely held and are free to move.

An electrical circuit

To make electricity flow, there must be a continuous path or **circuit** for the current to flow through. There must also be an energy source to drive the current, often provided by a battery. The electricity can be used to power equipment. In a simple circuit, this could be a bulb, buzzer and motor that will light, sound or rotate when electricity flows through it. A switch can be used to open or close the circuit: when it is open (off), there is a gap and electricity cannot travel round; when it is closed (on), the circuit is complete and electricity can travel round. All electrical equipment, whether a simple light bulb or a sophisticated device, contains an electrical circuit and this often contains a switch.

Components of a circuit

A battery, bulb, buzzer, motor, switch and connecting wires are called **components** of a circuit. All components added to a circuit must be connected into and made part of the circuit to allow the electricity to flow continuously round. We use symbols that are internationally recognised to represent components in a circuit. With a battery, the current flows one way all the time.

Conductors and insulators

All components in a circuit resist (slow down) the flow of electricity to some degree. Materials in which electricity flows easily are called **conductors**. All metals are good conductors, and water is also a good conductor. Materials that are good electrical conductors are also good conductors of heat. Materials in which electricity flows with difficulty or not at all are called **insulators**. Glass, paper, wood and many plastics are insulators. You can test whether an object conducts electricity by connecting it up in a circuit with a battery and a bulb or buzzer – if it does, then the bulb/buzzer will light/sound.

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More information and ideas

Go to the Institute of Physics website, which includes experiments and addresses common misconceptions: http://www.iop.org/activity/outreach/resources/pips/topics/electricity/index.html http://www.iop.org/activity/outreach/resources/pips/topics/electricity_generation2/index.html

Key knowledge and concepts for children

Year 4

- Recognise that common appliances run on electricity
- Recognise that electricity can flow through the components of an electrical circuit and will only flow if the circuit is closed i.e. has no gaps.
- Recognise that the components of a circuit will usually include an energy source such as a battery, something that uses energy such as a bulb or buzzer, connecting wires, and switches to open and close the circuit. All components must be connected into and made part of the circuit.
- Recognise that electricity can flow more easily through some materials than others.
    - Materials that electricity can pass through easily are called conductors and materials that electricity passes through poorly or not at all are called insulators. Recognise that all metals are good conductors and many plastics are insulators.

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