TOPIC 5 Electricity

About this topic

Curriculum link: Year 6, Electricity

SUMMARY:

This topic builds on the Year 4 work on electricity, taking it into the scientific use of symbols for components in a circuit, as well as considering the effect in more detail of changing components in a circuit. The children have the opportunity to apply their learning by creating an electronic game.

UNITS:

5.1: Think like an electrician
5.2: Changing circuits
5.3: Build your own

ACTIVITY RESOURCES:

5.1 Circuit symbols
5.2 Circuit diagrams

ONLINE RESOURCES:

Teaching slides (PowerPoint): Electricity
Interactive activity: Electricity
CPD video: Electricity
Pupil video: Electricity
Word mat: Electricity
Editable Planning: Electricity
Topic Test: Electricity

Learning objectives

This topic covers the following learning objectives:

- Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.
- Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on / off position of switches.
- Use recognised symbols when representing a simple circuit in a diagram.

Working scientifically

This topic develops the following working scientifically skills:

- Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.
- Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.
- Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.
- Use test results to make predictions to set up further comparative and fair tests.
- Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.
- Identify scientific evidence that has been used to support or refute ideas or arguments.

CROSS-CURRICULAR LINKS

This topic offers the following cross-curricular opportunities:

English

- Write instructions for making a circuit.
- Research scientists and write biographies, e.g. Edison, Volta.
- Research daily life prior to electricity.
- Write a leaflet, text for packaging and an advert for a circuit game.
- Plan and give a talk in assembly to explain a new 'Switch it off' campaign for using less electricity.
- Research alternative energy sources, e.g. solar and wind power.
- Research modern inventors, e.g. James Dyson.

Numeracy and mathematics

- Practise multiplication for voltage in a circuit related to the number of batteries.
- Reading and calculating electricity bills.
- Reading the school electricity bill.

Computing / ICT

- Play interactive electrical circuit activities.
- Use the Internet safely for research.
- Take photographs and create video clips of circuits.

Design and technology

- Design and make, test and evaluate an electrical device that warns a sight-impaired person when water in a cup gets to a certain point.
- Design, make, test, evaluate and advertise an electrical game.
- Design and make a working model using an electric circuit.

History

- Research scientists discovering electricity and inventing electrical appliances.
- Timeline of electrical appliances.
- How has electricity impacted on modern life, e.g. light and noise pollution, pollution from power stations, life-saving medical equipment?

Drama

- Role-play a famous scientist.
- Script and perform a play for younger children about being safe around electricity.

HEALTH AND SAFETY

Remind children how to stay safe when using mains electricity and that used batteries should not be placed in the bin but put in a special container so that they can be taken to a local supermarket to be recycled.

STEAM (SCIENCE TECHNOLOGY ENGINEERING ART AND MATHS) OPPORTUNITIES

Invite into class

- An electrician to talk to children about their job, health and safety, training.
- An elderly person to discuss changes over the years relating to electricity e.g. appliances.
- Someone involved in renewable energy sources or conserving energy.

Visit

- Local energy centre.
- Wind turbine industry.

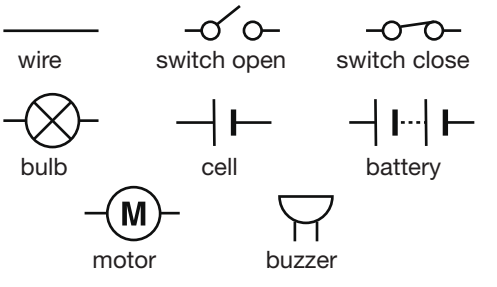
TEACHER SUBJECT KNOWLEDGE

Circuits

Before you start any work on circuits with the children, it is crucial that you test that all the batteries work, as well as the bulbs. A simple circuit will allow you to do this. Ensure you have plenty of spare batteries and bulbs handy as they do run out and blow respectively during lessons! Also ensure that the bulbs and batteries are rated correctly so the children don't blow too many or will not be able to see the light.

A current will only pass around the circuit if it is complete. Any break in the circuit will reduce the current to zero throughout the whole circuit.

To make representation of circuits easier and clearer, symbols are used, such as these:



When getting the children to draw circuits, these should be completed with a ruler to make square circuits, rather than free-flowing wires. The positive end of the cell (single battery) is the longer line. A series of single batteries (cells) makes a 'battery'.

Resistors

Resistors restrict or limit the flow of current in a circuit. Resistance is how easily electricity can pass through a material in a circuit. Different materials have different levels of resistance and this can be used to change the resistance in a circuit and change the brightness of a bulb. Good conductors, e.g. metals have a low resistance, they allow electricity to move through more easily than, for example, plastic, which therefore has high electrical resistance.

Changing the length and the thickness of wire in a circuit will change the resistance. The thinner the wire the harder it is for electricity to move through, the thicker the wire the easier. The shorter the wire the less resistance, the longer the wire the greater the resistance.

CHILDREN'S MISCONCEPTIONS

Children may believe...

- That a wire isn't a component.
- That if a bulb isn't working, it is a flat battery, but sometimes it is the voltage of the bulb compared to the battery that is wrong, or the blub that is blown.

Children already know...

- That a complete circuit is required for a bulb to light.
- That batteries produce electricity.
- That an electric current passes through a circuit.
- That metals are good conductors.
- That some devices run off mains and some off batteries.
- That batteries have two ends.

SCIENTIFIC VOCABULARY:ELECTRICITY

You can download a Word mat of essential vocabulary for this topic from *My Rising Stars*.

battery: a series of cells

blow: what happens when a bulb has too much electricity going through it

cell: a single battery that supplies power to the circuit

complete: something (a circuit) that doesn't have any gaps in it

component: something that makes up part of a circuit such as a bulb or wire

electrons: what makes up electricity: negatively charged particles

filament: the very thin wire, like that in a fuse, and that is inside a bulb

fuse: a safety device that will melt and make a break in a circuit if there is too much electricity