YEAR 6 UNIT 5: Electrifying (Electricity)

Enquiry Question: What happens when you use different components?

Related units: Year 4 Unit 5: Power it Up – How does a circuit work?

Unit overview

National Curriculum Link Year 6: Electricity.
Children will associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. They will 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. They will use recongised symbols when representing a simple circuit in a diagram. This topic builds on the Year 4 work on electricity. They will already know that a complete circuit is required for a bulb to light; that batteries produce electricity; that some devices run off mains and some off batteries; that an electric current passes through a circuit; that metals are good conductors; and that batteries have two ends. They also know that batteries produce electricity, that an electric current passes through a circuit, that metals are good conductors and that a complete circuit is needed for the component in the circuit to work. Children will construct simple circuits to help them to answer questions about what happens when they try different components e.g. switches, bulbs, buzzers and motors. Children are only expected to learn about series circuits and not parallel circuits. Children should be taught to take the necessary precautions for working safely with electricity.

Scientific vocabulary

- Cell
- Complete
- Component
- Electrons
- Renewable
- Solar
- Symbols
- Variables
- Circuit
- Conductor
- Crocodile
- Current
- Filament
- Fuse
- Blow

Activities and Working Scientifically

Children will work scientifically by systematically identifying the effect of changing one component at a time in a circuit;

Simple circuits
Record using diagrams.

It's faulty
Record using scientific diagrams and present findings including conclusions.

Blow!
Record using scientific diagrams and present findings including conclusions.

How bright?
Record using scientific diagrams, graphs, present findings including conclusions.

Games galore
Record using scientific diagrams.

It's all new
Identify scientific evidence that has been used to support or refute ideas or arguments about renewable energy.

Assessment

1. Describe the difference between wires usually used for circuits and fuse wires
2. Suggest 2 ways of changing the brightness of a bulb in a circuit
3. Provide names for some electrical components
4. Explain how a switch stops the motor turning

Cross-curricular links

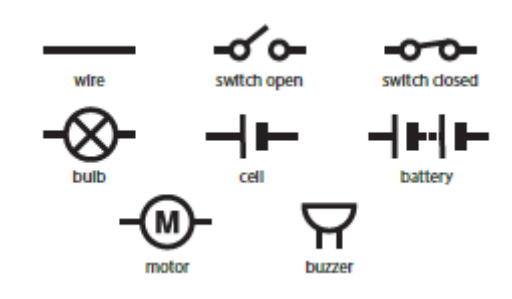
English: Report and present findings, including conclusions, causal relationships and explanations.

Maths: Record data and results using tables.

Teacher knowledge

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 do not blow too many or will not be able to see the light. A circuit will only work if there are no gaps in it. 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.

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'.



A fuse inside a plug contains a thin length of wire, which is designed to melt if the current is too high. In normal use, a current passes because the wire is a conductor.

A number of fuses will be required for this activity. A few of the fuses should have blown. Use 1A quick blow fuses as working fuses. Use 250mA quick blow fuses as the blown fuses. To melt the fuse wire, connect the fuse directly across the terminals of a battery. This will need to be done in advance. There are some very simple activities that the children can use to apply their learning. The simplest games, in the first section, are focused on completing a circuit by correctly locating two points on a board.

The children will need to consider what they need to use for the conduction of the electricity – cooking foil works well as it can be flexible but thin, and shows up less than extra wires on the back of card.

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Did you know?

- Electricity can be generated when you rub a balloon on your hair or on a nylon jumper
- Electricity travels at the speed of light – more than 300,000 km/second!
- A bolt of lightning can measure up to three million (3,000,000) volts and it lasts less than one second
- Electricity can be made from sand, water, sunlight and even animal poo
- A 600-megawatt natural gas plant can power 220,000 homes
- The first power plant – owned by Thomas Edison – opened in New York City in 1882. He also invented more than 2000 new products, including almost everything needed for us to use electricity in our homes: switches, fuses, sockets and meters.

Misconceptions: Children might thing that…

- a wire isn't a component; in fact, if it is part of the circuit, it is a component
- if a bulb is not working, it is a flat battery, but sometimes it is the voltage of the bulb compared to the battery that is wrong, or the bulb that is blown
- electricity is always best from renewable sources
- solar power is only from the sun

Resources

www.kidsenergyzone.com/games/activitiesdetail63.cfm?activityid=8 - is a game about changing bulbs and saving electricity and energy.
www.primarygames.com/holidays/christmas/games/xmastreelightup/ - light up the Christmas tree circuit game.
www.bbc.co.uk/bitesize/ks2/science/physical_processes/electrical_circuits/read/1/ - facts and information to support children on complete circuits and symbols.
www.shiftingphases.com/2012/04/15/k-12-engineering-squishy-circuits-tips-and-tricks/ - great for fun circuits, made with playdough.
www.bbc.co.uk/schools/scienceclips/ages/10_11/changing_circuits_fs.shtml - a game about changing circuits. www.nufeldfoundation.org/practical-physics/how-fuses-work shows a circuit to be able to test fuse wire
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www.kids.esdb.bg/newenergy.html - has information for children to research renewable energy sources.
www.alliantenergykids.com/EnergyandTheEnvironment/RenewableEnergy/ - has some useful definitions and further information.
www.childrensuniversity.manchester.ac.uk/interactives/science/energy/renewable/ - is a great website that has some exhibits as well as information on where we get electricity from