The Canons CE Primary School

Year 4 – Electricity

Prior Learning

In the EYFS children will be taught to:

- use all their sense in hands-on exploration of natural materials
- understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.

In Year 4

In Year 4 children will be taught to:

- describe how to work safely with electricity
- identify metals that are good conductors
- recognise and describe some common insulators
- recognise and describe some common conductors
- describe the impact of an open and/or closed switch on a simple series circuit
- describe what will happen if the circuit isn't complete
- create a simple series electrical circuit using basic parts
- identify the basic parts of a simple series electrical circuit e.g. cells, wires, bulbs, switches and buzzers
- identify common appliances that run on electricity.

Key Vocabulary

electricity, electrical appliance/device, mains, plug, electrical circuit, complete circuit, component, cell, battery, positive, negative, connect/connections, loose connection, short circuit, crocodile clip, bulb, switch, buzzer, motor, conductor, insulator, metal, non-metal, symbol

NB Children in Year 4 do not need to use standard symbols for electrical components, as this is taught in Year 6.

Future Learning

In Year 6 children will be taught to:

- investigate and describe the variations in how components function e.g. the brightness of bulbs, loudness of buzzers and on/off position of switches
- investigate the impact the number and voltage of cells has on the volume of a buzzer
- investigate the impact the number and voltage of cells has on the brightness of a lamp
- construct simple series circuit diagram using recognised symbols.

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Famous Scientists	Common Misconceptions	Possible Evidence to be Secure
• Michael Faraday – discovered relationship between magnets and electricity • Joseph Swan – incandescent light bulb • Thomas Edison – invented electric light bulb • Benjamin Franklin (1706-90) – showed that lightning is caused by electricity • Charles Augustine Coulomb (1736-1806) – invented instruments for measuring the forces between magnets and between charges. The unit for measuring an amount, or charge, of electricity is named after him. One coulomb (symbol C) is the amount of electricity that flows past any point when a current of one amp flows for one second. • Alessandro Volta (1745-1827) – invented the first battery. The volt, the unit of electromotive force, is named after him. • Andre-Marie Ampere (1775-1836) – his studies allowed people to measure the amount of electric current flowing through a circuit. Thus, the current is measured in units called amperes, or amps for short. One amp is a flow of about 6 million million million electrons per second.	Some children may think: • electricity flows to bulbs, not through them • electricity flows out of both ends of a battery • electricity works by simply coming out of one end of a battery into the component.	Children can: • name the components in a circuit • make electric circuits • control a circuit using a switch • name some metals that are conductors name materials that are insulators.

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Working Scientifically

National Curriculum Statutory Requirements

1. Ask relevant questions and use different types of scientific enquiries to answer them.
2. Set up simple practical enquiries, comparative and fair tests.
3. Make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.
4. Gather, record, classify and present data in a variety of ways to help in answering questions.
5. Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts and tables.
6. Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.
7. Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.
8. Identify differences, similarities or changes related to simple scientific ideas and processes.
9. Use straightforward scientific evidence to answer questions or to support their findings.

Highlighted = main focus during this topic

Teaching Ideas – Different Types of Scientific Enquiry

Comparative and Fair Testing	Identifying and Classifying	Observation Over Time	Pattern Seeking	Research
Which metal is the best conductor of electricity? How does the thickness of a conducting material affect how bright the lamp is?	How would you group these electrical devices based on where the electricity comes from?	How long does a battery light a torch for?	Which room has the most electrical sockets in a house?	How has electricity changed the way we live? How does a light bulb work?

Teaching Ideas – How Pupils Could Work Scientifically

(Bracketed Number = National Curriculum Statutory Requirement Link)

- Construct a range of circuits. (2)
- Explore which materials can be used instead of wires to make a circuit. (2)
- Classify the materials that were suitable/not suitable for wires. (4)
- Explore how to connect a range of different switches and investigate how they function in different ways. (8)
- Choose switches to add to circuits to solve particular problems, such as a pressure switch for a burglar alarm. (2)
- Apply their knowledge of conductors and insulators to design and make different types of switch. (7)
- Make circuits that can be controlled as part of a DT project. *NB Children should be given one component at a time to add to circuits.* (2)

Teaching Ideas – Possible Evidence to be Secure

Children can:

- communicate structures of circuits using drawings which show how the components are connected (5)
- use classification evidence to identify that metals are good conductors and non-metals are insulators (4)
- incorporate a switch into a circuit to turn it on and off (7)
- connect a range of different switches identifying the parts that are insulators and conductors (7)
- add a circuit with a switch to a DT project and can demonstrate how it works (7)
- give reasons for choice of materials for making different parts of a switch (6)
- describe how their switch works. (6)