The Cathedral School Of St Peter and St John R.C Primary **Electricity**

Year Four - Electricity

National Curriculum Objectives:

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- Identify common appliances that run on electricity.
- Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.
- Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery. • Recognise that a switch opens and closes the circuit and associate this with whether or not a lamp lights in a simple series circuit.
- Recognise some common conductors and insulators, and associate metals with being good conductors.
- Know the difference between a conductor and an insulator; giving examples of each.
- Safety when using electricity.

Non statutory: Pupils should construct simple series circuits, trying different components, for example, bulbs, buzzers and motors, and including switches, and use their circuits to create simple devices. Pupils should draw the circuit as a pictorial representation, not necessarily using conventional circuit symbols at this stage; these will be introduced in year 6. Note: Pupils might use the terms current and voltage, but these should not be introduced or defined formally at this stage. Pupils should be taught about precautions for working safely with electricity. Pupils might work scientifically by: observing patterns, for example, that bulbs get brighter if more cells are added, that metals tend to be conductors of electricity, and that some materials can and some cannot be used to connect across a gap in a circuit.

Inspiring science key ideas:

- Identify common appliances that run on electricity.
- Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.
- Identify whether a lamp will light in a simple series circuit, based on whether the lamp is part of a complete loop with a battery.
- Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit.
- Recognise some common conductors and insulators, and associate metals with being good conductors.
- Electricity can be dangerous.
- Electricity sources can be mains or battery.
- Batteries 'push' electricity round a circuit and can make bulbs, buzzers and motors work.
- Faults in circuits can be found by methodically testing connections.

Drawings, photographs and diagrams can be used to represent circuits (although standard symbols need not be introduced until UKS2).

Working scientifically

- *Observing patterns, for example, that bulbs get brighter if more cells are added, that metals tend to be conductors of electricity, and that some materials can and some cannot be used to connect across a gap in a circuit.*

Prior learning	Key Learning – What the pupils need to know				Vocabulary
In Early Years: • May have some understanding that objects need electricity to work • May understand that a switch will turn something on or off.	Electrical power sources. Lots of devices are powered by electricity; these need a source of electricity, which could be mains or battery.	What batteries do? The battery's job is to push electricity to the device, but it needs something to carry the electricity all the way from the supply to the device, this is what we call a circuit	Making devices work harder. If there are more batteries they push harder and so the device will work harder e.g. brighter or faster.	Insulators and conductors. However not everything can carry the electricity from the source to the device, some materials allow the electricity through (conductors) and others don't (insulators)	Electricity, electric current, appliances, mains, crocodile clips, wires, bulb, battery cell, battery holder, motor, buzzer, switch, conductor, electrical insulator, conductor.

In Year 6:

- 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.

The Cathedral School Of St Peter and St John R.C Primary Electricity

Year Six - Electricity

National Curriculum 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.

Non statutory: Building on their work in year 4, pupils should construct simple series circuits, to help them to answer questions about what happens when they try different components, for example, switches, bulbs, buzzers and motors. They should learn how to represent a simple circuit in a diagram using recognised symbols. Note: Pupils are expected to learn only about series circuits, not parallel circuits. Pupils should be taught to take the necessary precautions for working safely with electricity. Pupils might work scientifically by: systematically identifying the effect of changing one component at a time in a circuit; designing and making a set of traffic lights, a burglar alarm or some other useful circuit.

Inspiring science key ideas:

- 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.
- Circuit diagrams can be used to construct a variety of more complex circuits predicting whether they will 'work'.

(Background information for teachers: The effect of changing components in a circuit can be linked to the amount of push from the batteries or the ease of flow of the electricity through devices (motors/bulbs/wires) e.g. a bulb might dim when more bulbs are added).

Working scientifically

- *Systematically identifying the effect of changing one [thing] component at a time in a circuit.*

Designing and making a set of traffic lights, a burglar alarm or some other useful circuit.

Prior learning	**Key Learning – What the pupils need to know**				**Vocabulary**
	Batteries are a store of energy. This energy pushes electricity round the circuit. When the battery's energy is gone it stops pushing. Voltage measures the 'push.' b) The greater the current flowing through a device the harder it works. c) Current is how much electricity is flowing round a circuit. d) When current flows through wires heat is released. The greater the current, the more heat is released.				
In Year 4: • Identify common appliances that run on electricity. • Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. • Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery. • Recognise that a switch opens and closes the circuit and associate this with whether or not a lamp lights in a simple series circuit. • Recognise some common conductors and insulators, and associate metals with being good conductors.	Pushing electrical current The power supply pushes the current round the circuit. The voltage of the power supply is a measure of this push. Batteries have a limited store of energy, when it is gone they no longer push the current	Electrical current makes devices work When current goes through a device it makes it work, the greater the current the harder the device works	All devices resist current When any device is placed in the circuit it makes it harder for current to flow (resistance). The more devices the greater the resistance and the lower the current.	Electrical current has a heating effect As current goes through a conductor it heats it up. The greater the current flowing the greater the heating effect. This can be useful in electrical heaters but can be hazardous and cause fires	cell (battery), wire, bulb, bulb holder, buzzer, motor, switch (open/closed), complete circuit, electrical conductor, electrical insulator, component, circuit symbol, circuit diagram, standard symbols, voltage connection, component, break, fault devices, appliances, mains electricity, safety common materials e.g. metal, wood, plastic Expressions for making suggestions using 'if', 'might', 'could' connection, mains, wire, break Comparative expressions e.g. brighter, less bright (bulbs); faster, slower (motors) Note words which have a different meaning in other contexts e.g. circuit, break, bulb, fault).

• Know the difference between a conductor and an insulator; giving examples of each. • Safety when using electricity.					
In KS3: • Electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge • Potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current • Differences in resistance between conducting and insulating components (quantitative). • Separation of positive or negative charges when objects are rubbed together: transfer of electrons, forces between charged objects • The idea of electric field, forces acting across the space between objects not in contact.					