

## Year 6 Physical Science: Electricity (Circuits and Resistance)

## Unit 3

<p><b>Scientific Model (KS2):</b>  <b>Energy Transfer Model</b></p> <ul style="list-style-type: none"> <li>- To have a concept that electrical energy is transferred from the battery to the bulb along the wire. Energy is lost at the bulb as heat or light energy. The remaining electrical energy is transferred from the bulb back to the battery. Voltage is the measure of the amount of energy transferred.</li> </ul>	<p><b>Scientific Skills Applied:</b></p> <p>ASK</p> <ul style="list-style-type: none"> <li>- To ask different kinds of questions</li> <li>- To make predictions based on evidence</li> </ul> <p>BREAKDOWN</p> <ul style="list-style-type: none"> <li>- To recognise and control variables in tests</li> <li>- To plan different enquiries to answer questions</li> <li>- To recognise when to use comparative and fair tests</li> <li>- To plan when to take repeat readings</li> </ul> <p>CAPTURE</p> <ul style="list-style-type: none"> <li>- To choose and use a range of equipment precisely</li> <li>- To decide how to record data</li> <li>- To decide what observations and measurements to make</li> </ul> <p>DESCRIBE</p> <ul style="list-style-type: none"> <li>- To use evidence from enquiry to support or refute ideas being tested</li> <li>- To use varied ways to present data</li> <li>- To identify and comment, using appropriate language, on patterns they notice</li> <li>- To use relevant scientific language and illustrations in reports and when drawing conclusions</li> </ul>
<p><b>Science investigations:</b></p> <ul style="list-style-type: none"> <li>- Looking for Naturally- Occurring Patterns and Relationships</li> <li>- Comparative and Fair Testing</li> </ul>	
<p><b>Scientists:</b></p> <ul style="list-style-type: none"> <li>- Nikola Tesla - a scientist and inventor who specialised in working with electricity.</li> </ul>	

<p><b>Prior Learning:</b></p> <ul style="list-style-type: none"> <li>- Identify common appliances that run on electricity. (Y4 - Electricity)</li> <li>- Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches, and buzzers. (Y4 - Electricity)</li> <li>- 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. (Y4 - Electricity)</li> <li>- Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit. (Y4 - Electricity)</li> <li>- Recognise some common conductors and insulators, and associate metals with being good conductors. (Y4 - Electricity)</li> </ul>
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Curriculum	Learning Intention	Knowledge and Key Vocabulary
<p><b><u>Making links to learning and discuss the model (if needed)</u></b></p> <p>Have the concept that electrical energy is transferred from the battery to the bulb along the wire. Ensure electricity is referred to as electrical energy throughout unit.</p>	<p><b>Are you an electrical energy expert?</b></p> <ul style="list-style-type: none"> <li>• Recap energy transfer model and link to light energy (Year 3) and sound energy (Year 4).</li> <li>• Recap the key concepts learnt on electrical energy in Year 4.</li> <li>• Use rope model to emulate energy transfer.</li> </ul>	<p><b><u>Knowledge:</u></b></p> <ul style="list-style-type: none"> <li>- Electricity is energy.</li> <li>- Explain what is needed to make a complete circuit.</li> </ul> <p><b><u>Vocabulary:</u></b></p> <ul style="list-style-type: none"> <li>- Bulb, battery, cell, wires, switch, motor, buzzer, scientific, informal, circuit, diagram, electricity, current, conductor, insulator, electrical energy.</li> </ul>

<p><b><u>Knowledge and skills through investigations</u></b> Pupils should be taught to:</p> <ul style="list-style-type: none"> <li>- associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit</li> <li>- 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</li> <li>- use recognised symbols when representing a simple circuit in a diagram.</li> </ul> <p>Notes and guidance (non-statutory):</p> <ul style="list-style-type: none"> <li>- 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.</li> <li>- <b>Note:</b> Pupils are expected to learn only about series circuits, not parallel circuits.</li> <li>- Pupils should be taught to take the necessary precautions for working safely with electricity.</li> </ul> <p>Pupils might work scientifically by:</p> <ul style="list-style-type: none"> <li>- systematically identifying the effect of changing one component at a time in a circuit.</li> </ul>	<p><b>How have we come to learn about electrical energy and how to use it?</b> Explore the main historical discoveries made in the field of electrical energy. Learn about the difference between alternating and direct current. Identify how our understanding of electrical energy has changed over time. Explain how major discoveries affected our understanding and use of electrical energy.</p> <p><b>What is in a circuit?</b> Recognise the scientific symbols for the main parts of a circuit. Create and label circuit diagrams using scientific symbols.</p> <p><b>What difference does the volt make?</b> Draw circuit diagrams indicating the voltage. Observe and explain the effect of increasing or decreasing the voltage on different parts of a circuit.</p> <p><b>What is electrical resistance?</b> Select an appropriate scientific enquiry. Plan an investigation in detail. Decide which variables to control. Explain variations in functions of components. Link the resistance to energy transfer model</p> <p><b>What should you bear in mind when conducting an investigation?</b></p> <ul style="list-style-type: none"> <li>o use plan written to conduct an investigation.</li> <li>o adjust a plan if necessary</li> <li>o decide how to record findings as data.</li> <li>o decide how to report findings appropriately</li> <li>o decide and explain ways of establishing a higher degree of trust in results</li> <li>o use results to make new predictions</li> <li>o plan and conduct a further investigation</li> </ul>	<p><b><u>Knowledge:</u></b></p> <ul style="list-style-type: none"> <li>- Name 4 electrical conductor materials.</li> <li>- Name 4 electrical insulating materials.</li> <li>- Recognise and name electrical energy circuit symbols.</li> <li>- Create an accurate series circuit.</li> <li>- Draw a circuit diagram using recognised symbols.</li> <li>- Explain what will happen to components in a circuit if the number of cells/batteries is increased or reduced.</li> <li>- Explain why some metals are electrical conductors and other insulators.</li> <li>- Know that the electrical energy current is measured using volts.</li> <li>- Know how the number and voltage of cells in a circuit links to the brightness of a lamp or the volume of a buzzer.</li> </ul> <p><b><u>Vocabulary:</u></b></p> <ul style="list-style-type: none"> <li>- Electrical energy, Thomas Edison, Nikola Tesla, Alessandro Volta, Michael Faraday, home, alternating current, direct current, battery, cell.</li> <li>- Bulb, battery, cell, wires, switch, motor, buzzer, scientific, informal, circuit, diagram.</li> <li>- Voltage, circuit, bulb, wires, cell, battery, buzzer, motor, switch, circuit diagram, brightness, loudness, increase, decrease.</li> <li>- Bulbs, cell, battery, buzzers, investigation, plan, fair test, comparative test, practical enquiry, wire, length resistance.</li> <li>- Bulbs, cell, battery, buzzers, investigation, plan, fair test, comparative test, practical enquiry, wire, length degree of trust, objective, accuracy, reproducibility, consensus, sample size.</li> </ul>
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**Application and Assessment Activity**

**11 Model house**

10 A group of children are making a circuit for a door bell and lights in a model house.

The circuit symbols for the parts used in the circuit are shown below.

Write the name of each part next to its circuit symbol. One is done for you.

Circuit symbol	Name of part
	_____
	buzzer
	_____
	_____

11 The children make this circuit.

6 What must the children do to their circuit to turn the light bulbs and the buzzer on?

7 The buzzer only makes a quiet sound.

How could the children change the circuit to make the buzzer louder? Give TWO ways.

**Thinking Deeper:**  
 Children who have investigated the same components or similar questions compare their results. Are your findings similar? Is there a consensus that can be reached based on your results?

- Links to other subjects:**
- Subject Specific links –
    - Maths measuring and collecting data,
    - DT making a room alarm
  - Personal Development – electricity safety, not touching bare wires, wet hands, climbing pylons etc.
  - SMSC – understanding consequences of actions and behaviours regarding operating electrical items irresponsibly or putting self or others in danger.
  - Cultural Capital – visit to Nissan to see the technology used and the variety of roles within.
  - Careers – electrician, manufacturers of electrical goods, designer of electrical goods.
  - British Values – Respecting the environment and thinking of more green ways of producing electricity.

- Equality – sharing a sense of cohesion within the class by sharing and comparing results to inform their own.