Year 6 MTP

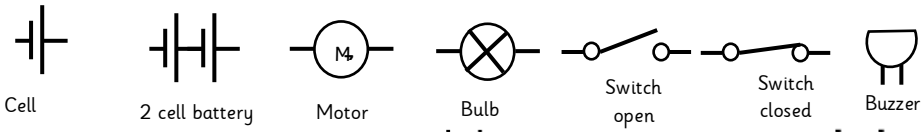
Electricity

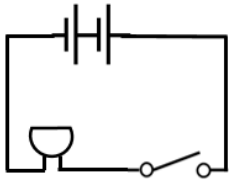
Year 6 Science, Autumn 1, Electricity

Key Vocabulary

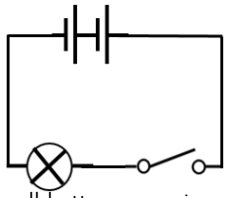
Voltage	The force moving the electric current through wires in a circuit.
Complete circuit	A circuit that is closed and the electricity can flow round
Series circuit	A circuit with only one route for the electricity to flow
Symbols	Used to picture components in a circuit
Resistance	The slowing effect on the movement of electrons around a circuit (caused by components and wires)
Electrons	Parts of an atom that can move – these are what move through a circuit.
Conductors	Materials where electricity passes through
Insulators	Materials where electricity does not pass through
Components	Parts of a circuit
Fault	When something is wrong with a component
Filaments	The resistance wire in a bulb

Component symbols and circuit diagrams

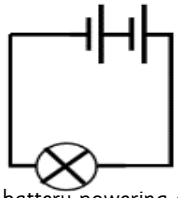




2 cell battery powering a buzzer.
Buzzer off as switch is open.



2 cell battery powering a light bulb.
Bulb off as switch is open.

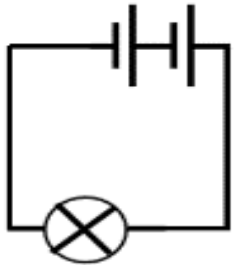


2 cell battery powering a light bulb.
Bulb on as circuit is complete

Brighter or louder?

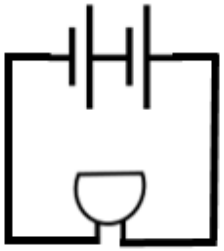
How can we make this bulb brighter?

- More batteries = higher voltage = more power around circuit
- Shortening the wires = smaller path = less resistance to flow through



Challenge…

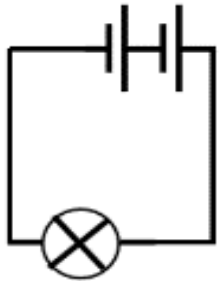
How can we make the buzzer louder?

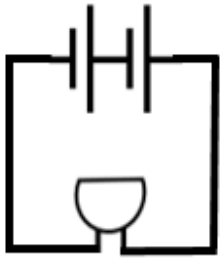


Dimmer or quieter?

What changes to these circuits will make the bulb dimmer, or the buzzer quieter?

- Remove batteries = less voltage = less power to flow through the circuit.
- More buzzers or more bulbs = power shared between more components = greater resistance = less power to each component.
- Longer wires = more distance to travel = greater resistance = less power.



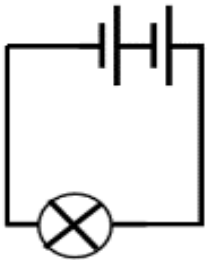


Series circuits

A series circuit = only one route for flow of electrons to take.

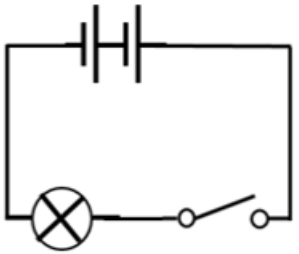
As more components are added, the more the power (voltage) has to be shared.

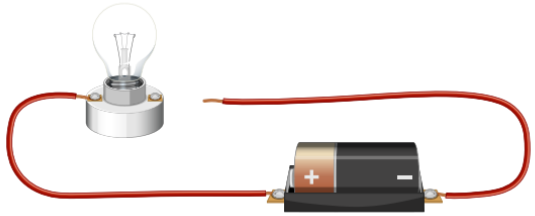
Any breaks in a circuit (e.g. switch / broken component) prevent the current from flowing around the circuit.

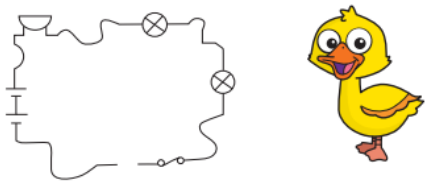


This prevents all components in the circuit from working.

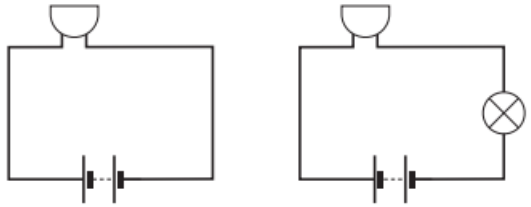
If you have a series circuit containing 200 lights, and one light bulb is broken, then whole set of lights will remain off until the break in the circuit is fixed.



#	Lesson title	Objective / content	Knowledge	Previous curriculum links	Vocabulary
Sequence 1	What do I already know?	Electricity (Year 4)	Starter activity: Max makes a circuit, but the bulb will not light.  What does Max need to do to fix the circuit? _____	Electricity (Year 4)	Complete circuit Electrons Conductors Insulators
			Note that children should be secure in this knowledge before moving on • Know that electrical energy is a form of energy • and does not operate through a **complete circuit.** • Know that current electricity is the flow of charged particles called **electrons** around a circuit. • Know that electrical current flows well through some materials – **conductors** • Know that electrical current doesn't flow well through some materials – **insulators** • Know that metal is a good electrical conductor • Know that more than one cell lined up is called a battery		
			Task: Children should create 'scientific understanding page' this should include the knowledge learnt from year 4 and the above knowledge. They should include scientific diagrams, labels, any understanding of scientist and scientific theory, equipment lists and can use secondary resources.		

Sequence 2	What is a series circuit?	Use recognised symbols when representing a simple circuit in a diagram	Starter activity: What is a complete and incomplete circuit?  • Know that electrical current can flow if there is a complete circuit. • Know that wires – which contain a conductor inside them, usually made of metal – can allow electrical current to flow around a circuit. • Know that when electrical current flows through a circuit component it starts to work – such as a buzzer starts to make noise or a bulb starts to emit light. • Know that a **series circuit** can be constructed by using **components**. • Know how to draw and construct simple circuit diagrams • Know the recognised **symbols** for a – cell, battery, wire, bulb, buzzer, closed/open switch and motor Line of enquiry -How can a concrete circuit be drawn scientifically and labelled?	Electricity (Year 4)	Series circuit Components Scientific diagram Symbols
Sequence 3	How do switches work?	Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the	Starter activity: Diddy has drawn a series circuit.  **a)** Identify two of Diddy's mistakes.	Electricity (Year 4)	Switch Complete / Incomplete circuit

		on/off position of switches	• Know that a **switch** functions by completing or breaking a complete circuit. • Know how to predict whether components will function in a given circuit depending on whether it is **complete** or not. • Know how to predict whether components will function in a given circuit depending on whether it is complete or not because of an open or closed switch • Know how to predict whether components will function in a given circuit depending on whether there is a cell to provide electrical current to the circuit. • Create series circuits that can be switched on and off using a switch Line of enquiry -Predict whether an electrical circuit will function and suggest ways of improving it Explorify - https://explorify.uk/en/activities/have-you-ever/tried-to-turn-something-on-when-it-wasnt-turned-on-at-the-plug		
Sequence 4	How can a fault be identified?	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	Starter activity: Children to be given electrical equipment / pictures of/ names and classify them into a Venn diagram – children should create their own headings for the classification and classify the same objects more than once • Know how to identify **faults** in a series circuit for the following reasons - It has a flat battery - It has a broken bulb - It has two battery's but one is the wrong way round - It has the wrong voltage bulb in, so it is not bright enough - The wires are not connected - The bulb is not screwed in properly - It has one battery and four bulbs Line of enquiry -How can I test where a fault lies with multiple components? -How can I record my observations?	Electricity (Year 4)	Fault

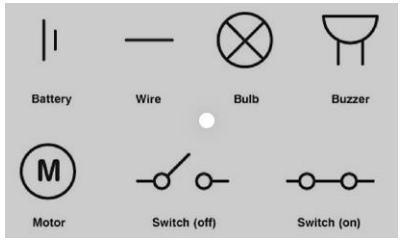
Sequence 5	How can a circuit be changed?	Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit	Starter activity: Which circuit will have a louder buzzer? Tick your answer.  Explain why this circuit has a louder buzzer. • Know that **voltage** is a measure of the power of a cell to produce electricity. • Know that voltage is a measure of 'push' of electric current • Know that as the voltage in a circuit increases so does the brightness or volume of a buzzer. • Know that fuses in plugs, **filaments** in bulbs are designed to 'blow' if the voltage in a circuit is too high for the component • Know that this is a safety measure to stop the circuit from overheating • Know that the more components you add to a circuit without changing the voltage means this energy is split between them and they emit less light, move slower, or make less sound. • Know that by changing components or voltage, we can make bulbs brighter, buzzers louder or motors quicker. Explorify - https://explorify.uk/en/activities/zoom-in-zoom-out/curly-coil **Task:** Variations within circuits – white rose science	Electricity (Year 4)	Voltage Filaments Blow
Sequence 6	Investigation	Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit	Starter activity – Give the children 3 diagrams of different circuits, children should annotate and label the pictures/diagrams -What equipment/components - will it work/ fault - where the circuit would likely be used	Electricity (Year 4)	

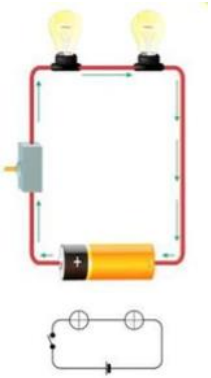
			Investigation Title - What effects the brightness of a bulb in a circuit? This can be exchanged for 'loudness of a buzzer' or 'speed of a motor' Prediction Equipment list Set up the investigation Method – This should be written in a paragraph form Variables – Children should explain the variables and how they will make this a fair test Observe/record – scientific diagrams and labels Results Conclusion Evaluate reliability – Children should recognise the degree of brightness from a bulb is an opinion and may not be reliable		

<table>
<tr><th colspan="3">Scientific enquiry</th></tr>
<tr><th colspan="3">Year 6 – Aut 1 – Electricity</th></tr>
<tr><td>Sequence 2 – What is a series circuit?</td><td>Line of enquiry
-How can a concrete circuit be drawn scientifically and labelled?

Children to create a simple series circuit using two wires, a battery and a component.

They should then draw and label this circuit using the scientific symbols.

Alternatively give children pictures of the concrete circuit they need to make that can sit next to the scientific diagram in their books
 

 </td><td>• planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
• taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
• recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
• using test results to make predictions to set up further comparative and fair tests
• reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations
• identifying scientific evidence that has been used to support or refute ideas or arguments</td></tr>
<tr><td>Sequence 3 – How do switches work?</td><td>Line of enquiry
-Predict whether an electrical circuit will function and suggest ways of improving it

Children look at 5 different defective circuit illustrations. They explain why each circuit will not work. Children should then change each circuit so that it will work, showing this in a circuit diagram.

Children to test their improvements with simple apparatus.</td><td>• planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
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<td>trust in results, in oral and written forms such as displays and other presentations
• Identifying scientific evidence that has been used to support or refute ideas or arguments</td>
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<tr>
<td>Sequence 4 - How can a fault be identified?</td>
<td>Line of enquiry
-How can I test where a fault lies with multiple components?
-How can I record my observations?

Teachers to create 5 faulty circuits
- It has a flat battery
- It has a broken bulb
- It has two battery's but one is the wrong way round
- The wires are not connected
- The bulb is not screwed in properly

Children are then to investigate how to identify the fault. Each group should be given a working battery and bulb so they can change components methodically to test for the fault in each circuit.

Children to record the changes they make each time and if this rectified the fault or not e.g.

<table>
<tr><th>Circuit no.</th><th>Can I see a fault?</th><th>What component I changed</th><th>Did this work?</th><th>The fault was…</th></tr>
<tr><td>1</td><td>No</td><td>The battery</td><td>Yes</td><td>The battery was flat</td></tr>
</table>
</td>
<td>• planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
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<td>Sequence 6 – Investigation</td>
<td>Investigation
Title - What effects the brightness of a bulb in a circuit?
This can be exchanged for 'loudness of a buzzer' or 'speed of a motor'

Prediction
Equipment list – Wires, bulbs batteries

Set up the investigation
Method – This should be written in a paragraph form</td>
<td>• planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
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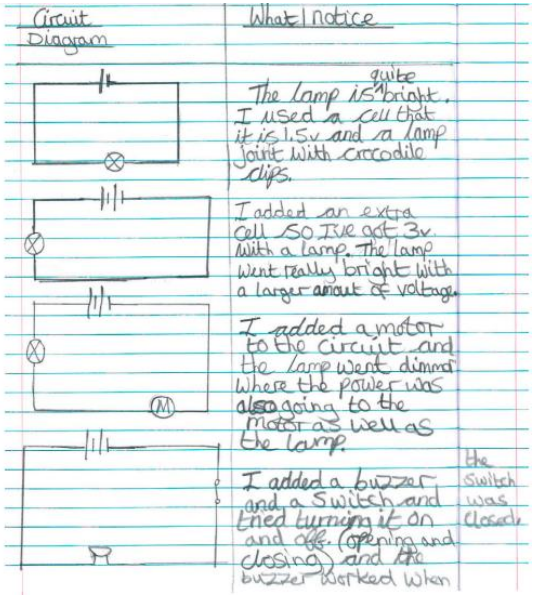
	Observe/record Results – scientific diagrams and labels  **Conclusion** **Evaluate reliability** – Children should recognise the degree of brightness from a bulb is an opinion and may not be reliable	• using test results to make predictions to set up further comparative and fair tests • reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations • identifying scientific evidence that has been used to support or refute ideas or arguments