YEAR 6: SPRING 1 – INVENTIONS
SCIENCE: Electricity

UNDERSTAND, DESCRIBE AND EXPLAIN:

To associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit

To 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

To use recognised symbols when representing a simple circuit in a diagram

Learning links:

Y4: Science Electricity

Benjamin Franklin	*Alessandro Volta*	*Michael Faraday*	*Thomas Edison*	*Lewis Latimer*

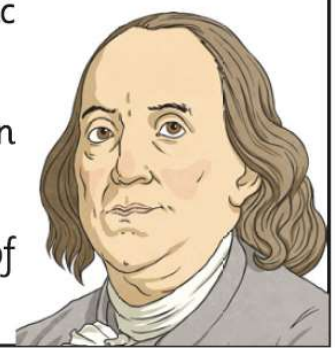
The History of Electricity:

Benjamin Franklin (1706 – 1790): Discovered electricity in 1752.

Benjamin Franklin was the first person to study electricity in depth. One of his most important findings was proving that lightning was electrical (it had been thought of as different up until then). He flew a kite during a storm, to which he had attached a key. When the kite was indeed hit by lightning, he felt electric sparks from the key.

He was very fortunate not to be electrocuted! This is not an experiment that needs to be repeated!!

He was also the first to store electricity and knew it consisted of positive and negative charges.



Alessandro Volta (1745 – 1827): Invented the battery (Voltaic pile) in 1800.

Alessandro Volta invented the first battery – which was known as the 'voltaic pile' as it was made of layers of zinc and copper which was either combined with sulphuric acid or saltwater brine to create an electric current.

Volta's name was also the basis for the following words:

Voltage: This is the electric force that causes free electrons to move from one atom to another.

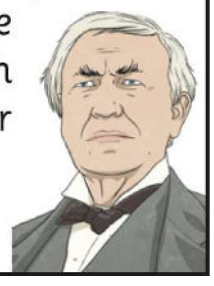
Volt: Is the unit of measurement for Voltage (written as V).

Michael Faraday (1791 – 1867): Built an electric motor and generator in 1822.

Michael Faraday used Volta's discoveries and was able to make an electric current move by using a magnet inside a wired coil. He was able to build an electric motor and generator!

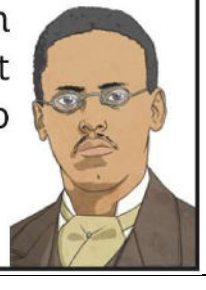
Thomas Edison (1847 – 1931): Invented the modern lightbulb in 1879.

Thomas Edison invented the modern lightbulb. While lightbulbs were not a new idea, he did improve on the previous designs which were not useful as they did not stay lit for very long.



Lewis Latimer (1848 – 1928): Invented the filament part of the lightbulb alongside Thomas Edison in 1881.

Lewis Latimer worked for Edison and invented a filament (the metal part that you can see in lightbulbs, through which the electric current passes) which enabled Edison's lightbulb to stay lit for a long time.



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Electrical circuits	***Current electricity***	***Flow***	***Electrical charge***	***Materials***	***Power supply***	***Mains***	***Single cell***
Positive charge	***Negative charge***	***Electrodes***	***Current (Amps)***	***Voltage (V)***	***Electrolyte***	***Conductors***	***Insulators***
Wires	***Bulb***	***Cell***	***Battery***	***Motor***	***Buzzer***	***Open switch***	***Closed switch***

Learning links:

Y4: Science Electricity

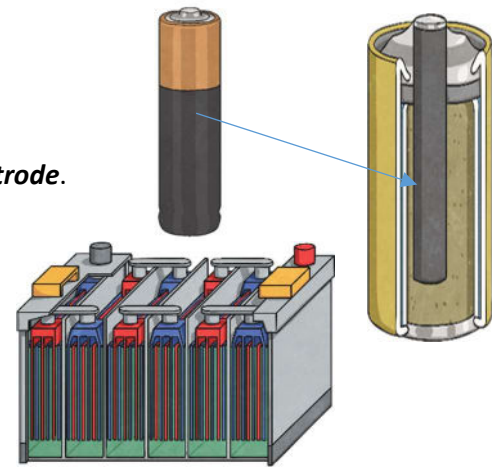
You should remember learning about electricity in Year 4.
If you cannot remember, or need to refresh your understanding, have a read of the Year 4 Electricity Learning Journey Map.

THINKING POINT:

What do you remember about your electricity learning from Year 4?

Electrical circuits:
Current electricity is the ***flow*** of ***electrical charge*** though ***materials***.
A ***complete circuit*** must have a ***power supply***. This ***power supply*** could be the ***mains***, or it could be a ***battery***.
For a ***circuit*** to be ***complete,*** there ***must*** be ***wires connected*** to ***both*** the ***positive*** and ***negative*** ends of the ***power supply***.
Electricity can ***only flow*** around a ***complete circuit*** that has ***no gaps***.

Cells and batteries:
In everyday ***language***, we call a ***single cell*** a '***battery'*** but this is ***not*** the ***correct scientific usage***.
Scientifically, this is a ***cell***. It is a ***single unit***, containing ***two electrodes*** and an ***electrolyte***.
Electrodes are ***charged*** electrical ***conductors*** inside a ***cell***. Each ***cell*** has ***one positive*** and ***one negative electrode***.
An ***electrolyte*** is a ***chemical*** that ***reacts*** with the ***electrodes*** to ***produce*** an ***electrical current***.
A ***battery*** is the ***scientific name*** for a ***collection*** of ***cells joined together***. For example, this ***car battery*** has ***lots*** of ***individual cells*** within ***one casing.***

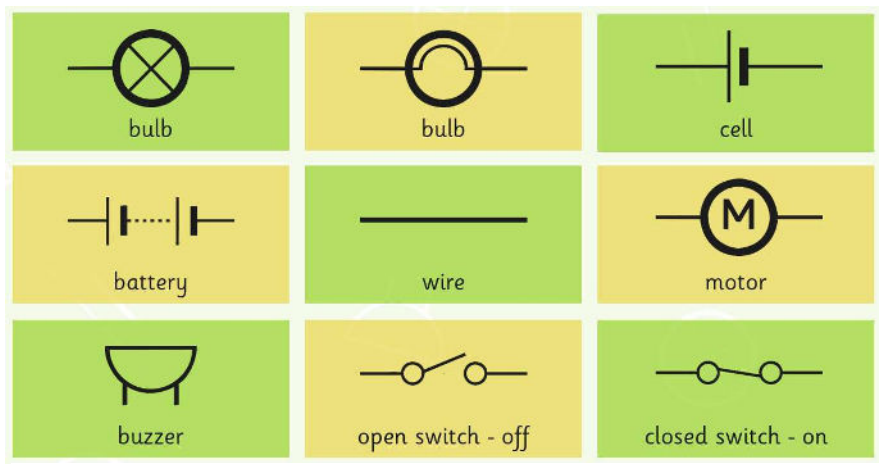


THINKING POINT:

What is the difference between a cell and a battery?

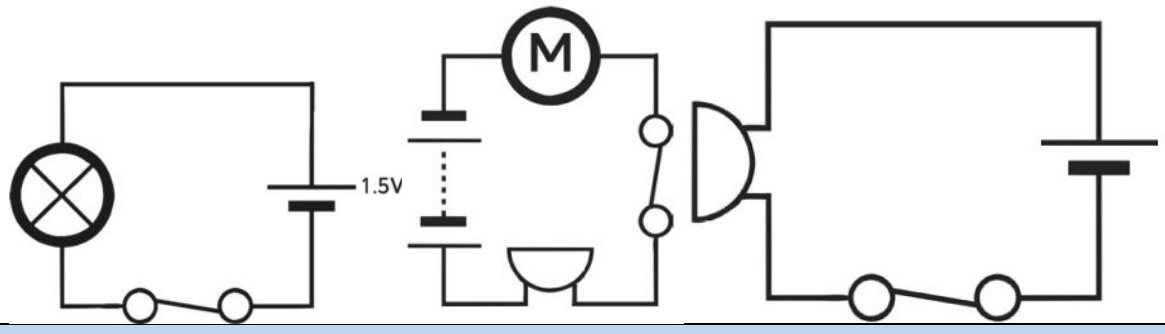
Current and Voltage:
Current is the ***steady flow*** of ***electrons*** and is ***measured*** in amperes (***amps***).
Voltage is the ***force*** that makes the ***electric current flow*** and is ***measured*** in ***volts*** (V).
The ***greater*** the ***voltage***, the ***more current*** will ***flow***.
You can find the ***measures*** of ***amps*** and ***volts*** written on ***batteries***.

Drawing circuits (scientifically):
When ***testing*** and ***building electrical circuits***, scientific ***symbols*** are used which are easy to draw and so that they can be understood by anyone. Here are the ***symbols***:



THINKING POINT:

Here are some examples of electrical circuits. Can you work out what the components are in these circuits?



EXPLORE AND INVESTIGATE:

HYPOTHESISE
ENQUIRE
TEST
RECORD
REPORT
CONCLUDE

Building simple series circuits, alter the makeup of the circuit to answer the following questions:

- Does the wire length affect the brightness of the bulb/loudness of the buzzer?
- Does the number of batteries/cells within a simple series circuit affect the brightness of the bulb/loudness of the buzzer?
- Does the number of working components (bulb/motor/buzzer) in a simple series circuit affect the brightness of the bulb/loudness of the buzzer?

Record your findings with accurate, scientific drawings of each circuit.

KEY ASSESSMENT AND APPLICATION OPPORTUNITIES:

EXS:

1. Can you build a simple series circuit and then draw a scientific diagram to match?
2. If you put a second battery in a simple circuit, how will it affect the volume of a buzzer?
3. Looking at this circuit, can you explain why it does not work and fix it?

GDS:

1. Imagine a circuit with a 1.5V battery and one bulb. Imagine a similar circuit with a 3V battery and two bulbs. Which has the brightest bulbs? Why?
2. Can you create a circuit where multiple bulbs are used but their brightness is equal? Buzzers? Motors?