Prior Learning: 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 recognized symbols when representing a simple circuit in a diagram

Year 7 -Physics 1

Big Idea: Number 4: ***The total amount of energy in the Universe is always the same, but it can be transferred from one energy store to another.***

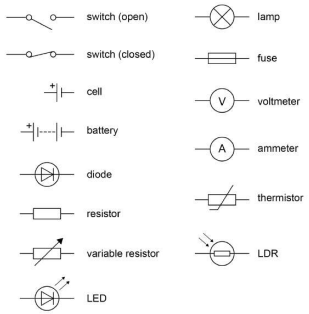
Oracy:
We should stop using gas boilers in all our homes

Keywords:
Conductors
Insulators
Current
Potential difference
Resistance
Amps
Voltage
Ohms
Ammeter
Voltmeter
Series circuit
Parallel circuits
Electric fields
Energy resources
Renewable
Non-renewable
Fossil fuels
Earth's Atmosphere
Global warming
Acid rain
Pollution
Combustion

P1.1a Draw a circuit diagram and explain how lights can be switched on and off from the bottom or the top of the stairs.	**P1.2a** Write a plan to describe how you could collect some data about how the size of batteries affects the potential difference across each one. What equipment would you need? What will your control variables be? Draw a results table you could use to record your data.	**P1.3a** Rub the balloon on your hair and see if you can make it stick to the wall. Repeat this and try to stick it to a door and then a window, and a car. Rub the balloon on your head or with a cloth, turn on the tap slowly, put the balloon near the water. Record your results and try to explain what is going on using key words - static, electron, charge, insulator, conductor.
P1.1b Write a letter to the UK government explaining why it is important that we should stop producing electrical power through burning fossil fuels. Suggest suitable alternatives to using gas boilers in our homes and combustion engines in vehicles.	**P1.2b** Research and produce a fact file of the life and discoveries of Alessandro Volta and Georg Simon Ohm. The fact file should include, when they lived, where they lived, their education, their discoveries and contributions to science and honours they received.	P1.3b In the late 19th century Nikola Tesla defeated Thomas Edison in the AC/DC battle of electric current. Imagine you are journalist reporting on this story and write a newspaper article informing the public about the battle!
P1.1c Build a simple circuit using LEDs Lights with wires (you can borrow one) and batteries. Investigate how changing the potential difference (volts) of the battery effects the brightness of the bulb. Record your results in a suitable table, draw a circuit diagram to show how you set up the circuit, write a conclusion based on your results.	P1.2c Research a method to make a citrus fruit battery OR a penny battery. Build your battery, draw a diagram or take a picture of your battery. Research and explain how your battery work.	P1.3c Research, design and build a model of an actual working wind turbine. Produce an information poster that informs people how wind power can produce electrical power. State the advantages and disadvantages of using wind power compared to non-renewable energy resources as well as other renewable resources.

Future Content: Electricity KS4, Energy KS4

Extended project - resistance of a wire – investigate how the length of a wire affects the resistance

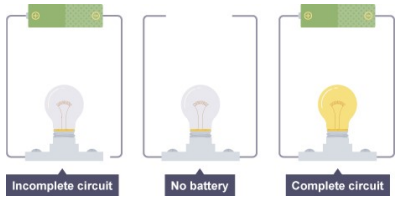


- an electrical **conductor** has a low resistance e.g. metals
- an electrical **insulator** has a high resistance e.g. plastic

Electric current

An **electric current** is a flow of charge, and in a wire this will be a flow of electrons. We need two things for an electric current to flow:

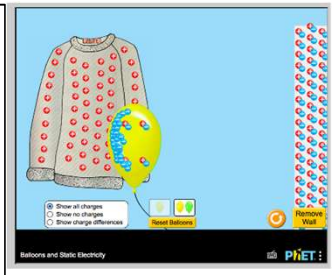
1. something to transfer energy to the electrons, such as a battery or power pack
2. a complete path for the electrons to flow through (an electric **circuit**)



All substances are made of **atoms**. These are often called particles. An atom is electrically neutral - has no overall electrical **charge**. However, each atom contains even smaller particles called **electrons**.

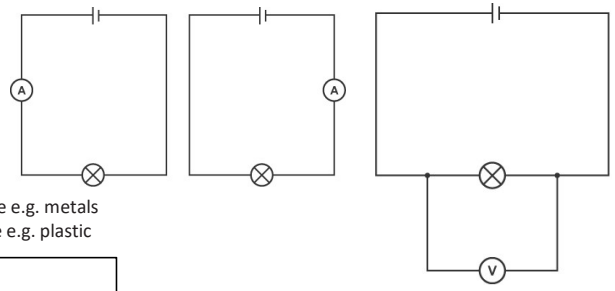
- Each electron has a negative charge.
- If an atom gains an electron, it becomes negatively charged.
- If an atom loses an electron, it becomes positively charged.

Electrons can move from one substance to another when objects are rubbed together. You may have done this with a party balloon: if you rub a balloon on your sweater, you can get the balloon to stick to the wall or to your hair. This is because of **static electricity**.



Measuring current

A device called an **ammeter** is used to measure current. Some types of ammeter have a pointer on a dial, but most have a digital display. To measure the current flowing through a component in a circuit, you must connect the ammeter **in series** with it.



	Current	Potential difference
Unit	ampere, A	volt, V
Measuring device	Ammeter in series	Voltmeter in parallel
Circuit symbol of measuring device	A	V

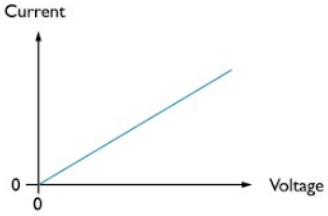
potential difference = current x resistance

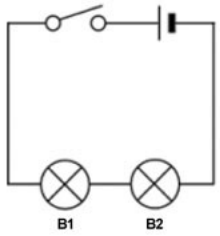
V = I R

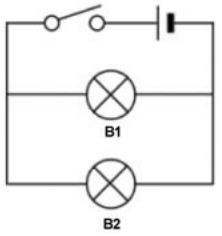
potential difference, *V*, in volts, V
current, *I*, in amps, A
resistance, *R*, in ohms, Ω

Measuring potential difference

Potential difference is measured using a device called a **voltmeter**. Just like ammeters, some types have a pointer on a dial, but most have a digital display. However, unlike an ammeter, you must connect the voltmeter **in parallel** to measure the potential difference across a component in a circuit.







When two components are connected in **series**, you can follow the path through both components without lifting your finger or going back over the path you have already taken.

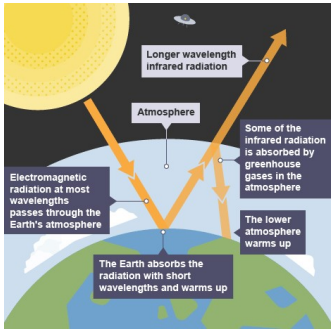
When two components are connected in **parallel**, you cannot follow the circuit through both components from one side to the other without lifting your finger or going back over the path you have already taken.

Electrical Rules - Series circuit

The current is never used up, it is the same through each component
The total potential difference is shared between components
The total resistance is the sum of the resistance of each component

Electrical Rules - Parallel

The **potential difference** across each component is the **same.**
The **total current** through the whole circuit is the sum of the currents through the separate components, as current can split at a junction.



Non-renewable energy resource cannot be replenished as it is being used e.g. coal, oil, natural gas and nuclear energy.
Renewable energy resources can be replenished (renewed) as they are being used e.g. Sun (solar), wind, water waves, hydro-electricity, tides, bio-fuels, geothermal