MY BOOK ABOUT ELECTRICITY CONDUCTORS INSULATORS

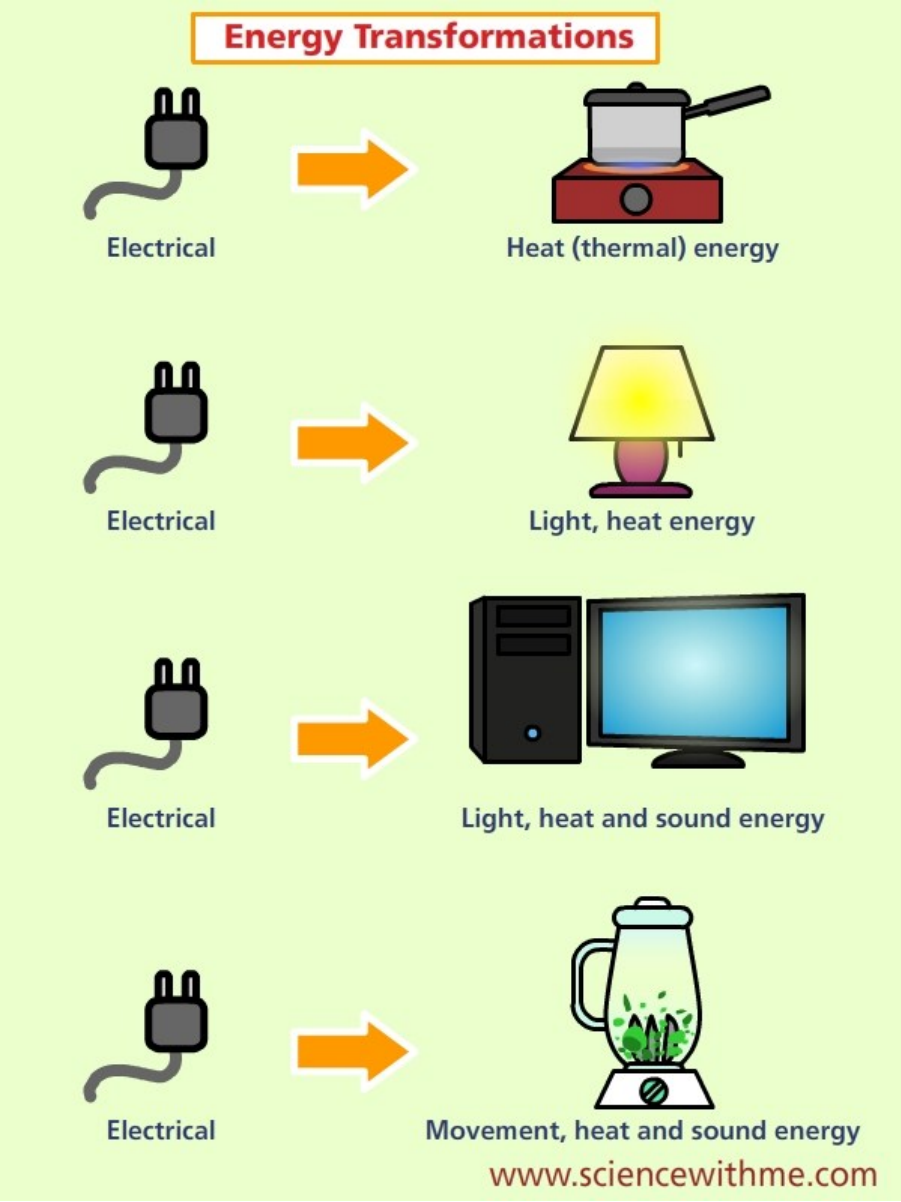
NAME: _____

2ND GRADE

Learn About Electricity

Electricity is a very useful form of energy. Electricity can be used to perform work such as:

- Heating our homes or our food (electrical energy is converted into light and heat energy)
- Lighting our lamps (electrical energy is converted into light and heat energy)
- Powering our computers (electrical energy is converted into light, heat and sound energy) or
- Powering a motor (electrical energy is converted into movement, heat and sound energy).

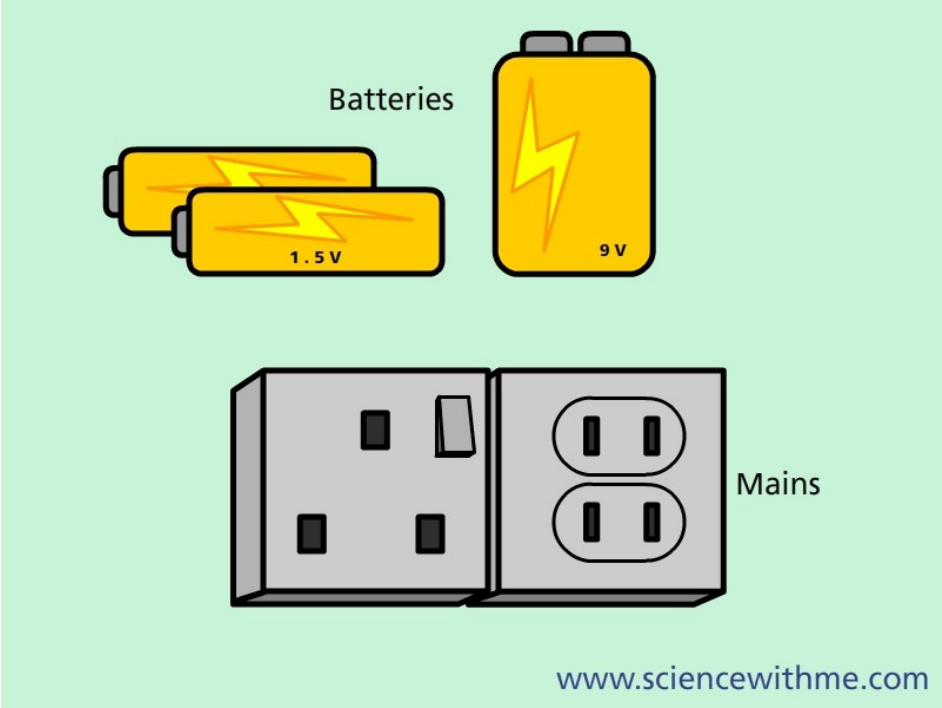


But where do these items get their electricity?

All appliances, whether small or large, need a **power source**.

What is a power source?

A **power source** provides a steady flow of electrons. Larger appliances like heaters and large computers usually get their power from the mains. But small batteries (cells) can also be a power source. The problem with electrical energy obtained from battery power though, is that battery power eventually runs out and the battery has to be thrown away or recharged. On the other hand, electricity flowing from a mains doesn't run out is much more powerful (and dangerous so be careful!).



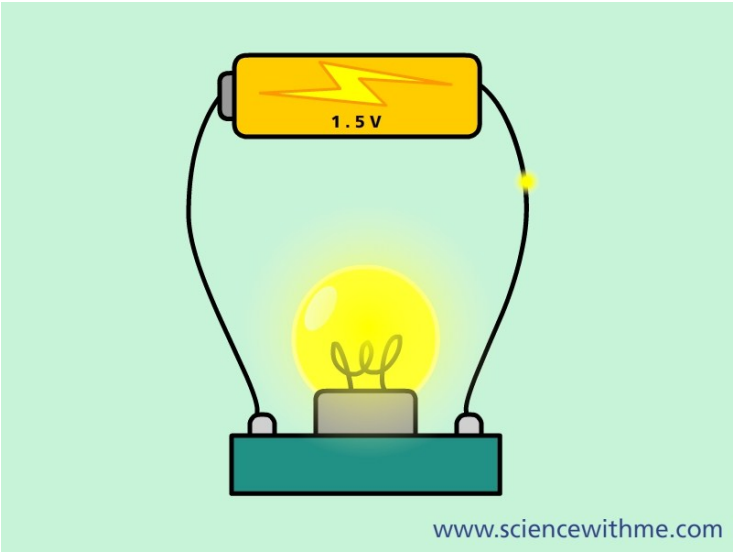
Electricity is a "secondary" source of energy. In other words other sources of energy are needed to produce electricity.

What is an electrical circuit?

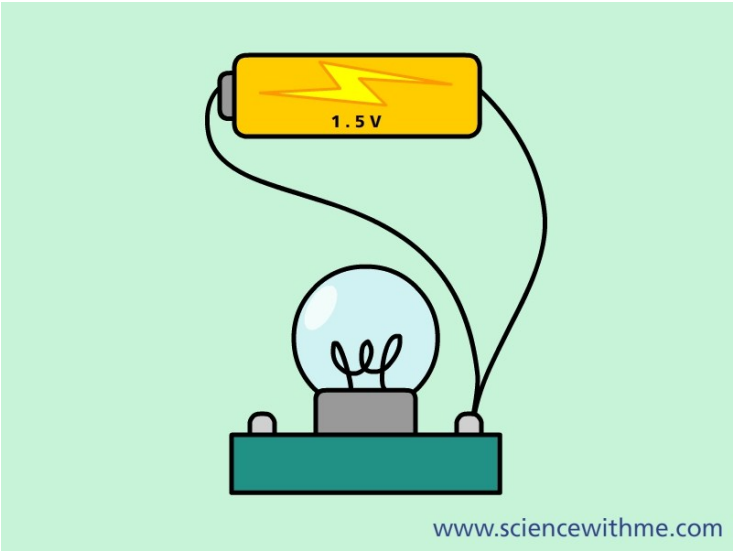
Electrical current needs a PATH on which to travel. Another name for this path is a **circuit**. Electricity flows from the power source, in a loop or a circuit, back to the power source. This means that the electricity must start and finish at the same power source. If the circuit is not complete (i.e. if the loop is not closed) then electricity cannot flow through it properly.

Test Yourself: Which one of these loops allows electricity to flow? LOOP1 or LOOP2? Explain your answer.

LOOP 1:



LOOP 2:



CURRENTS:

Electricity flowing through a circuit is called a **current**.

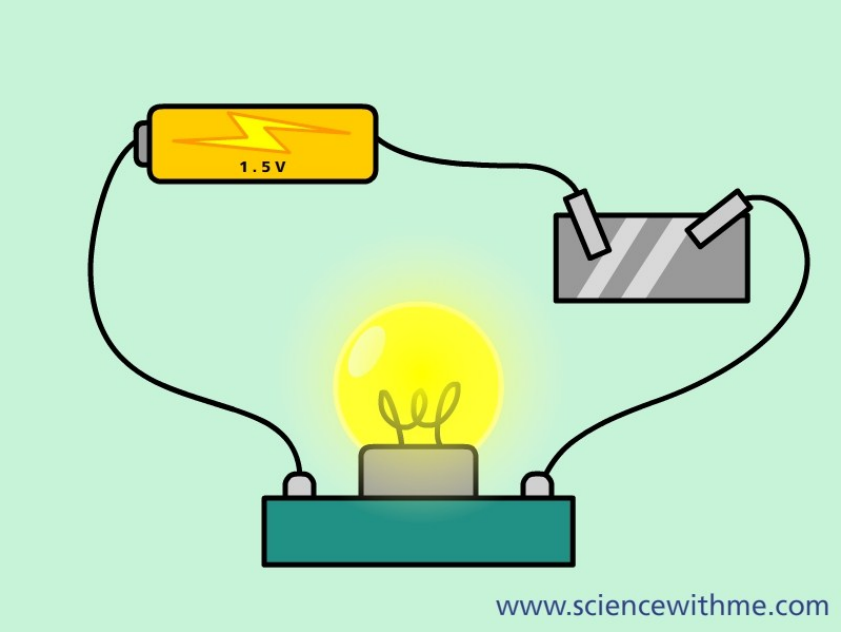
A **load** is a device that uses electricity (like a buzzer of a light blub). The load needs electrical energy to be able work.

The electric current from the power source flows from one place to another through the **wire** of a circuit.

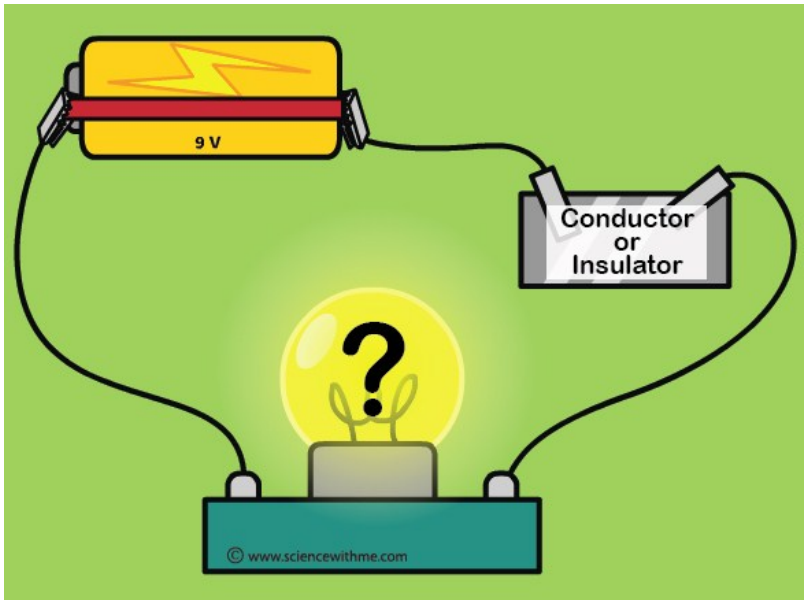
Conductors and Insulators:

These metal wires (**conductors)** are often wrapped in plastic (**insulators**) so as to stop the electric current flowing into objects that touch the wire.

If electricity flows through an object, then scientists say the object **conducts** electricity, and they call it a **conductor**. Metals are very good conductors. A small bit of energy is released as heat when electricity flows through the conductor.



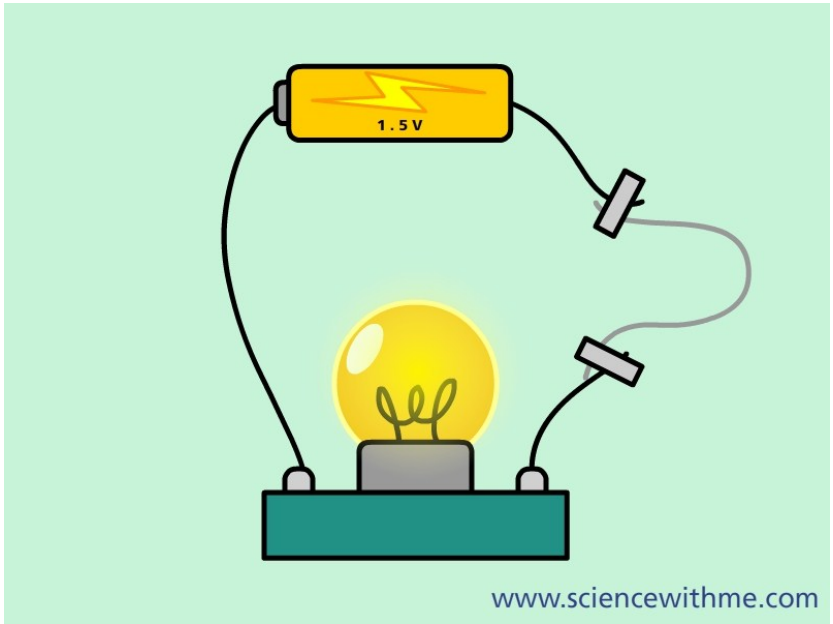
If electricity doesn't flow through an object then scientists call it an **insulator**. Plastic, wood and rubber are all very good insulators.



Click here (or go to http://www.mrsraysclassroom.com/science/electricity_experiment.pdf) for an experiment you can do to test if different materials are insulators or conductors.

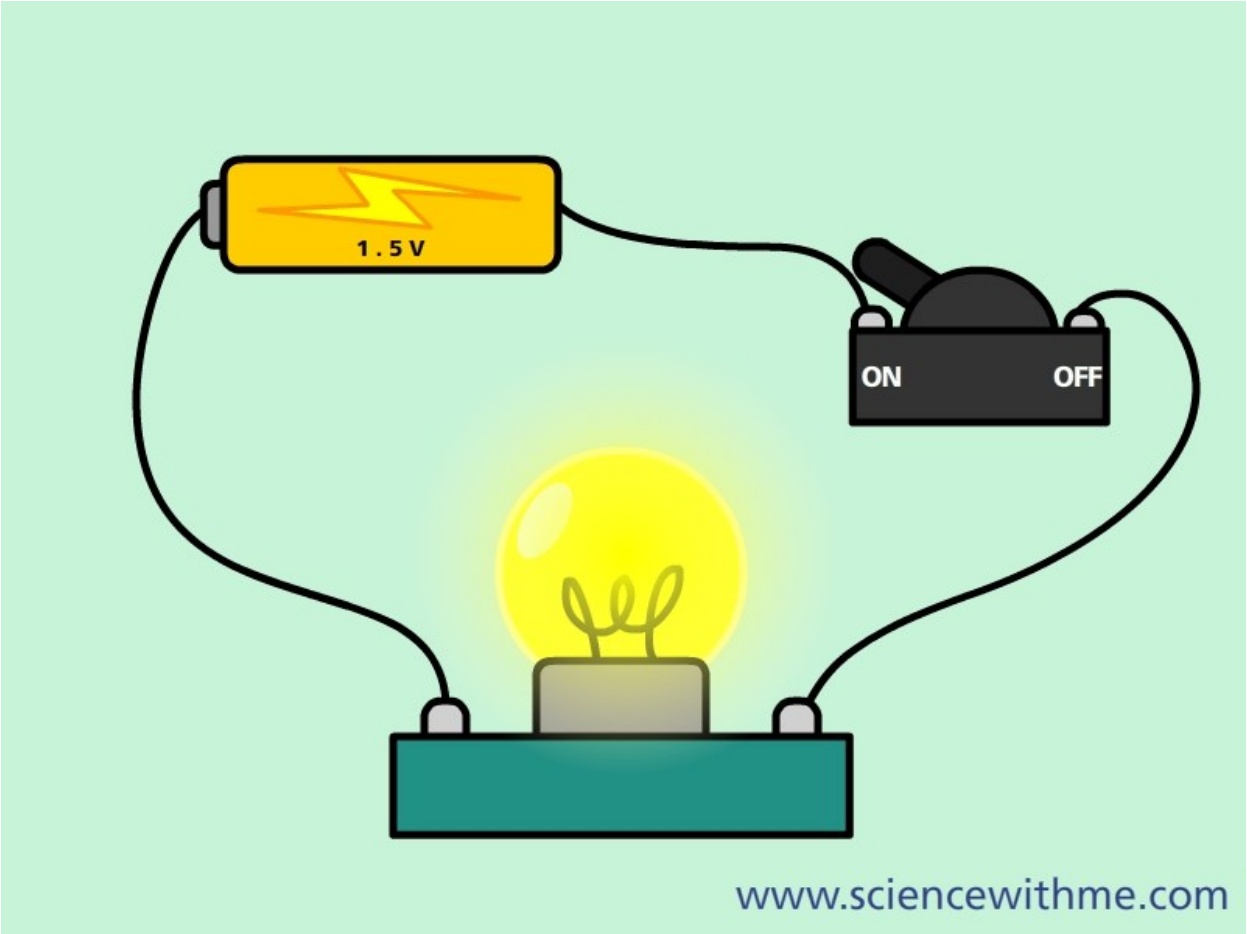
Also, try this online game: http://www.sciencekids.co.nz/gamesactivities/circuitsconductors.html

Another idea: You can increase a circuit by increasing the length of the connecting wire. What do you think will happen to the light bulb as the wire gets longer? How about as the wire gets shorter?



What is a switch?

Switches allow you control over the circuit. You can stop the flow of electricity by breaking the circuit. When the switch is in the “on” position the circuit is complete. When the switch is “off” position the circuit is broken.



Link here for some instructions to help you make your own switch or go to http://www.mrsraysclassroom.com/science/electricity_booklet.pdf.

How do I draw a circuit?

Sometimes circuits are drawn using special symbols. These symbols make it faster and easier to draw circuits and once you understand what the different symbols stand for, these diagrams are very easy to understand. However if you don't understand what the different symbols stand for, then the diagrams look a little strange!

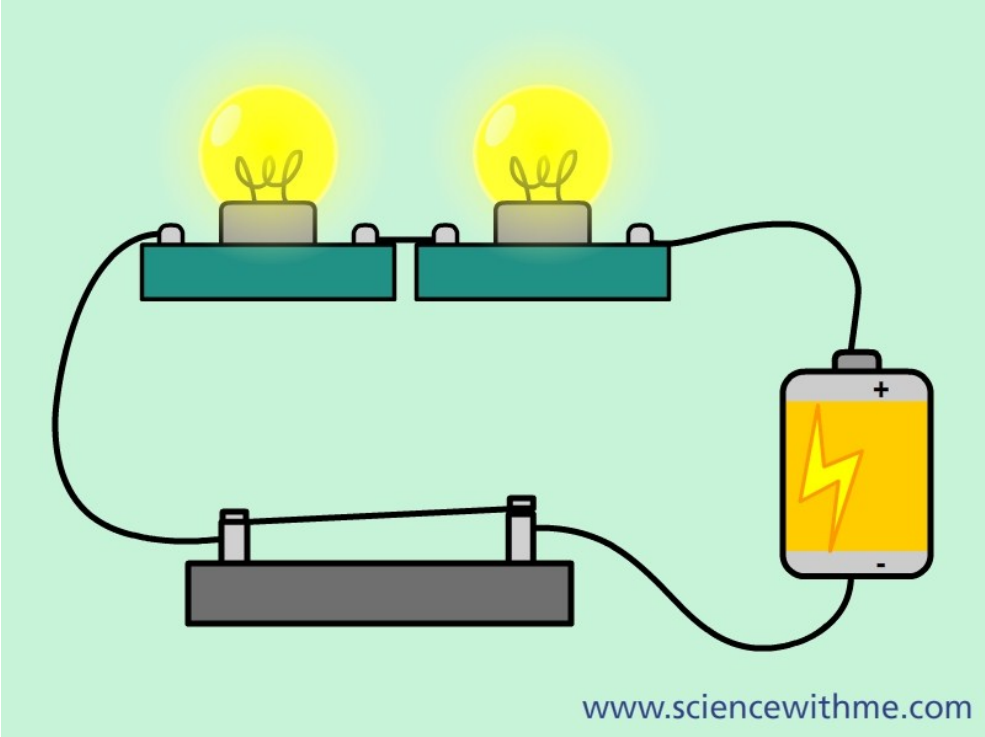
Here is a chart to help you to understand the different circuit symbols that are used in when drawing the different components of the circuit. Each circuit component has it's own symbol. These symbols are universal so we call all understand each other's diagrams.

Component	Symbol	Purpose
Cell (Battery)		Provides electrical energy
Power supply		Alternative to using cells
Wire		Allows current to travel
Bulb/light		Converts electrical energy into heat and light
Motor		Converts electrical energy into movement energy
Buzzer		Converts electrical energy into sound energy
Switch		Allows circuit to be opened or closed

“In Series” or “In Parallel” Circuits:

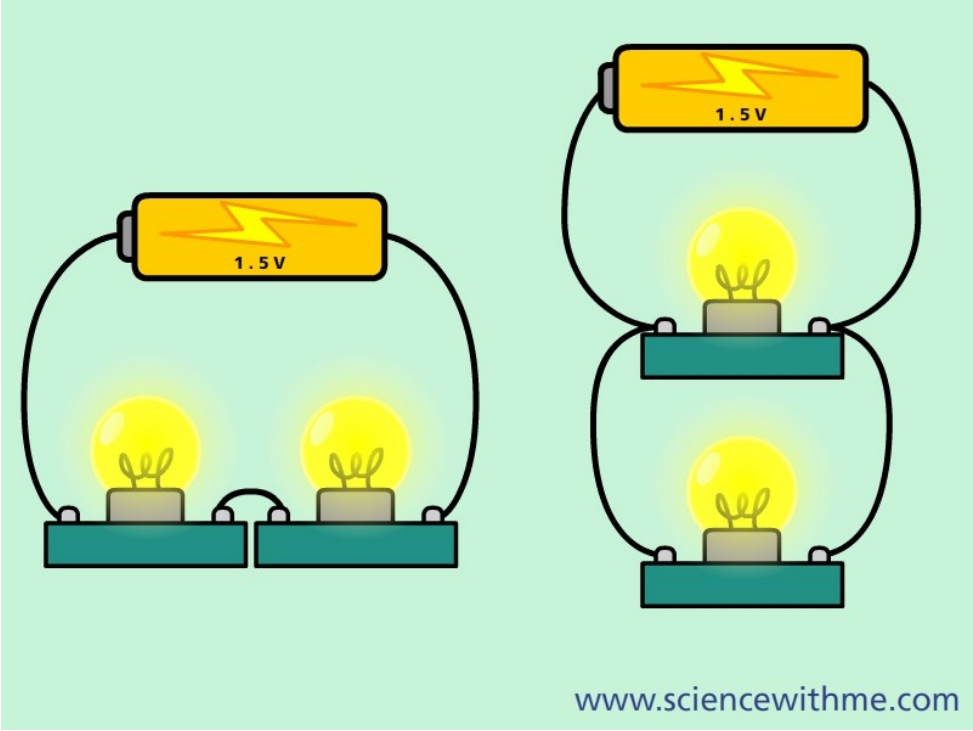
Whenever two components are joined together in the same circuit, there are two different ways they can be wired: **in series** or **in parallel.**

In the **in series** circuit the components are joined together in one bigger circuit i.e. one continuous loop. Electricity passes first through one component first then the next one. A disadvantage of the **in series** circuit is that when one component malfunctions, the other components will stop working.

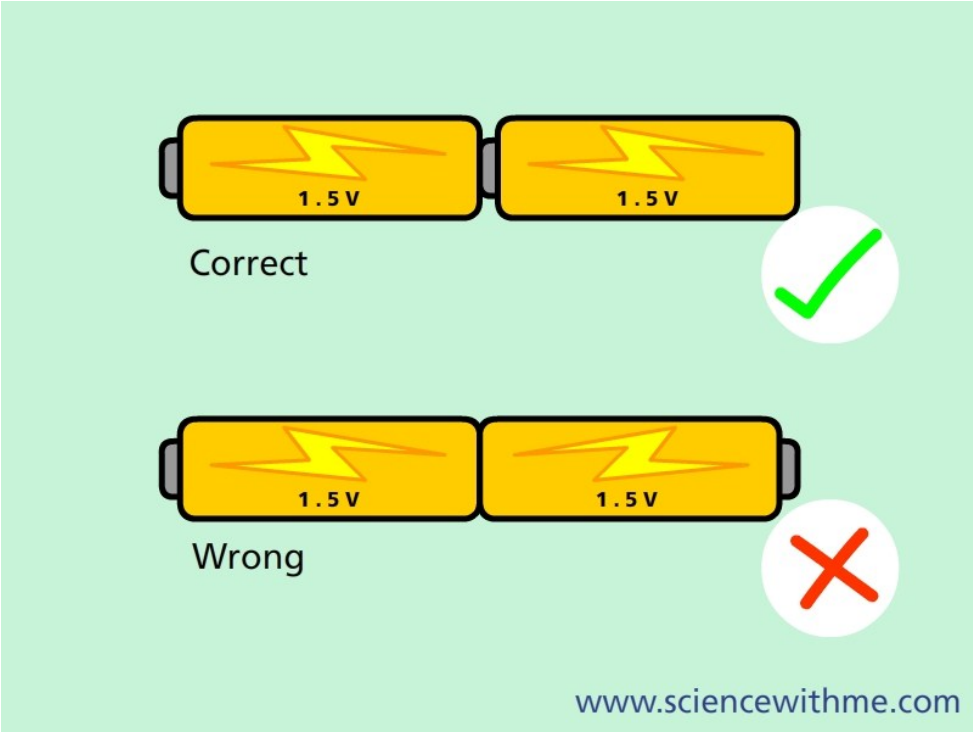


Another option would be to make two SMALLER circuits with each bulb having it’s OWN circuit **parallel** to one other. A major advantage of parallel circuits is that if one component malfunctions, the other continues to function.

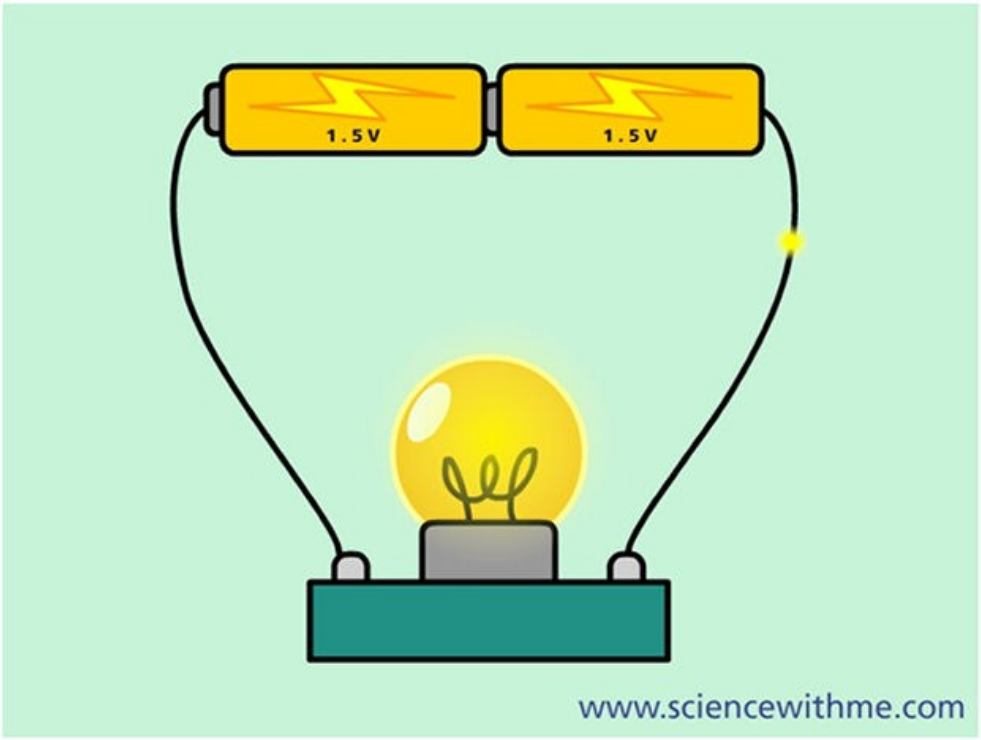
The diagram below shows the difference between these two types of circuits.



Batteries can also be connected in parallel or in series. But, if you are using more than one battery in a circuit they need to all face in the same direction to work. If two batteries are connected in series, then the voltages add together.



Adding more cells in a line (in series) will make the blub burn brighter.



QUESTION: What do you think would happen if you add too many cells in the series?