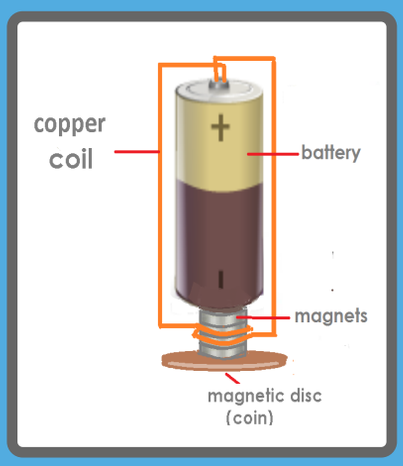
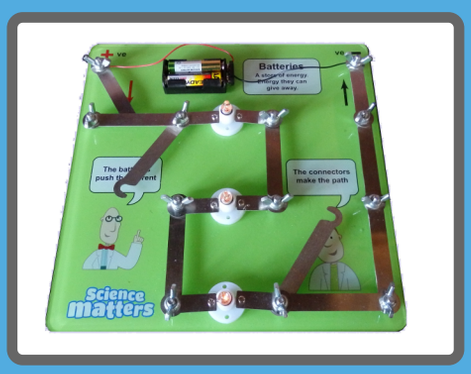
Science matters





Topic Electricity in the World Around Us

Name _____ Class _____

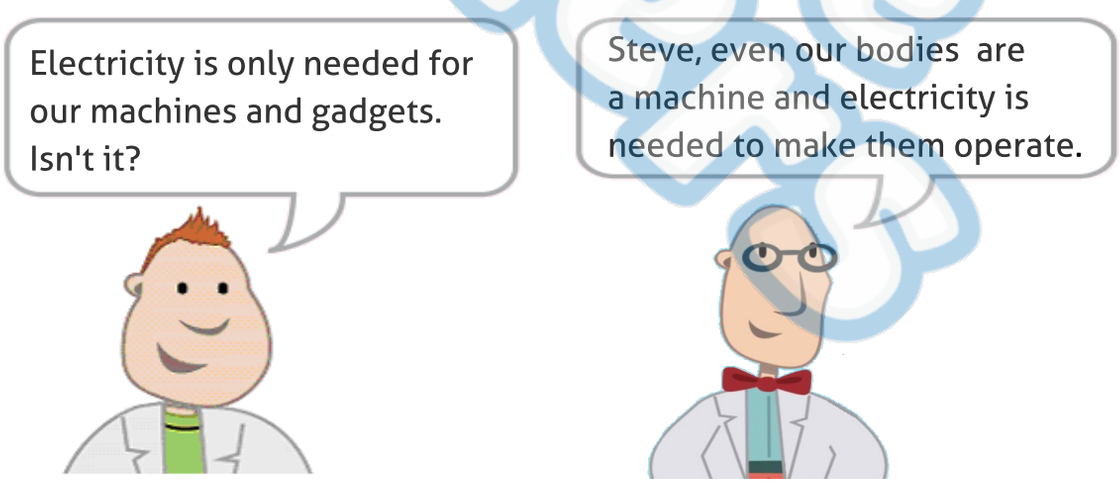
TOPIC **ELECTRICITY IN THE WORLD AROUND US.**

Just take a look around you, either at home, at school or even in your school bag. You should find evidence of electricity being a major player in our lifestyle today.

In the past century we have harnessed electricity and used it to radically change how we live our lives.

List some examples of how the use of electricity has brought change to our daily lives.

- _____
- _____
- _____
- _____
- _____



We may use electricity to run our machines but electricity has always been there helping everything in our world operate properly.

Our nervous system sends electrical signals throughout our body to help it to operate properly.

So what is electricity, and where does it come from?

Well everything is made up of tiny particles – very tiny particles. Inside these particles are other even smaller particles called ELECTRONS.

Electrons are the electricity particles.

These electrons can escape and travel from particle to particle. When they travel we call it an ELECTRIC CURRENT or simply ELECTRICITY.

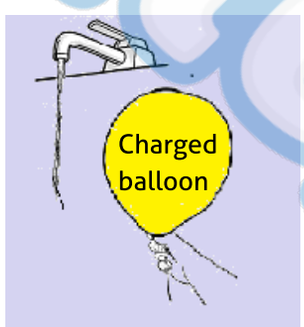
It is these ELECTRONS that help our world function properly.

STATIC ELECTRICITY

Quite often when we rub objects together electrons store up in one of the objects. This is called Static Electricity and we say the object is electrically charged.

Static electricity can cause strange things to happen.

When you charge up a balloon by rubbing it through your hair, your hair will then be attracted to the balloon.



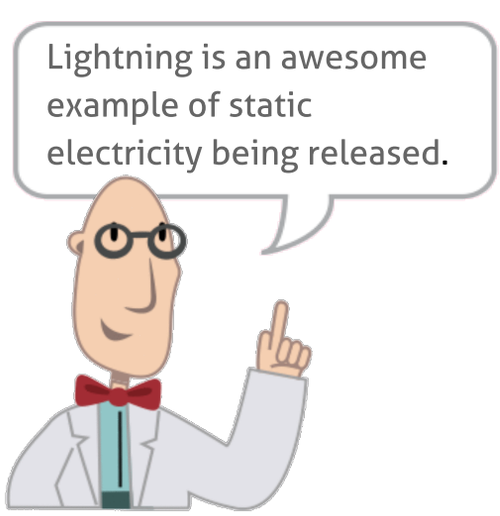
What happened to the trickle of water?

_____

_____

_____

Sometimes the electrons that are stored up escape suddenly.



Making use of Electricity.

To make use of electricity we build circuits in which the electricity flows.

An electric circuit provides a path for the electricity to flow around. An invisible pushing force from a battery or a power supply is used to keep the electricity flowing around the circuit.

The size of the batteries pushing force is measured in_____.
The amount of electricity flowing is measured in _____.
The flow of electricity is also called the electric _____.

Remember the electricity is **already** in the bits and pieces of the circuit but the battery is needed to make the electricity flow.

A Fun Circuit Tester.

How did the 'Energy Ball' or circuit tester show us that a circuit had been successfully completed?

_____

_____

What must be flowing around each circuit causing the 'ball' to work?

_____

Reporting back

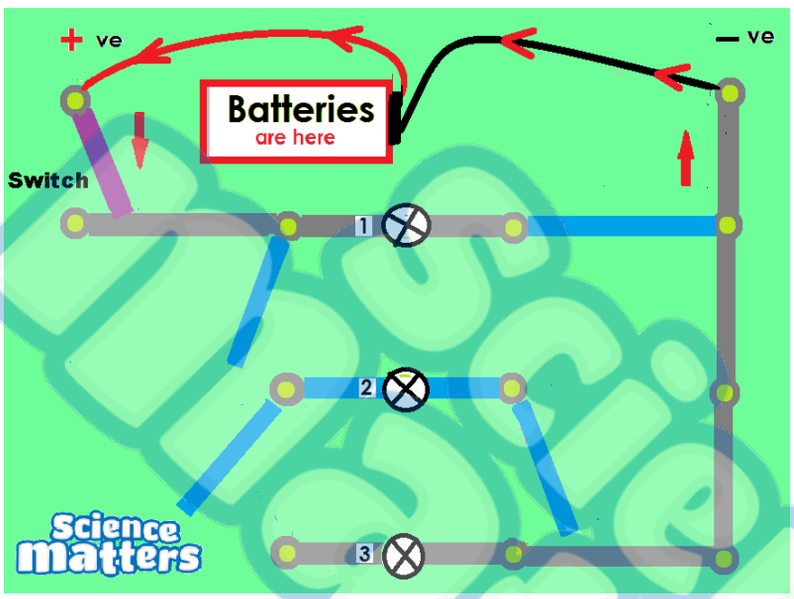
What did you learn from using the circuit tester?

- _____
- _____
- _____
- _____

Investigating circuits using your Science Matters circuit board.

Remember follow your teacher's instructions.

1. By using only one battery (insert a connecting strip in place of the other battery) set up your circuit board as shown below.



Word Box

Dimmer
Brighter
Current
Flows Circuit
More Lost

Close the switch (coloured purple in the diagram).

What happens?

The _____ only flows through bulb _____ so only bulb _____ will light.

Draw arrows on the circuit diagram to show the path taken by the current.

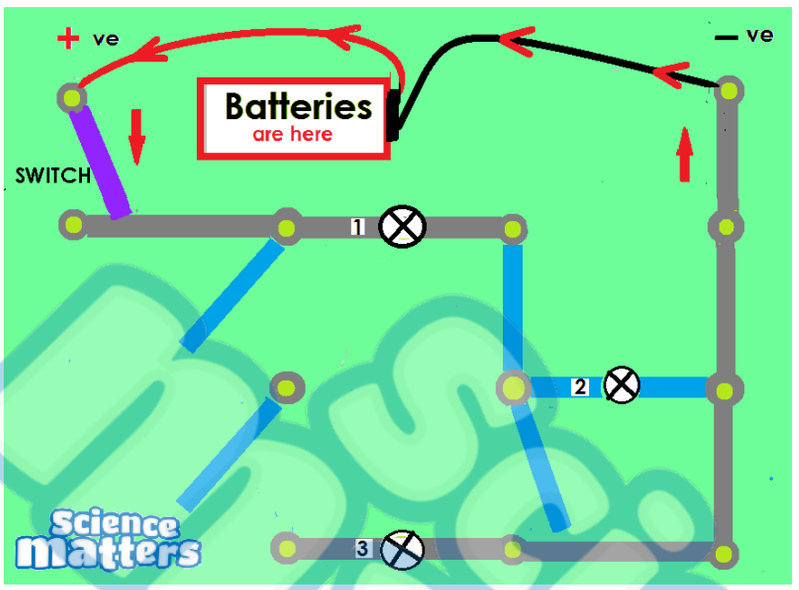
Now connect **two batteries** instead of one. Close the switch.
What happens?

With two batteries connected bulb 1 becomes _____
this happens because more _____ is flowing.

The current that _____ out from the batteries flows around the _____ and back in to the batteries again.

None of the current is used up or _____.

2. Set up your circuit board as shown below.



Word Box

Dimmer	
Brighter	Lit
Current	Gap
Path	Circuit
More	Less
Go out	Light

Close the switch.

Which bulbs light up? _____

Again draw arrows to show the path taken by the current.

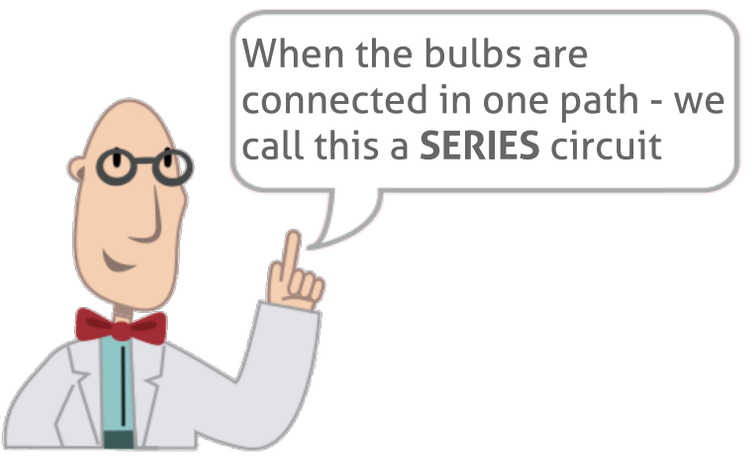
Now that two bulbs are connected what happened to the brightness of the bulbs? Why do you think this happened?

The bulbs are _____ than before this is because there is _____ _____ flowing through the circuit.

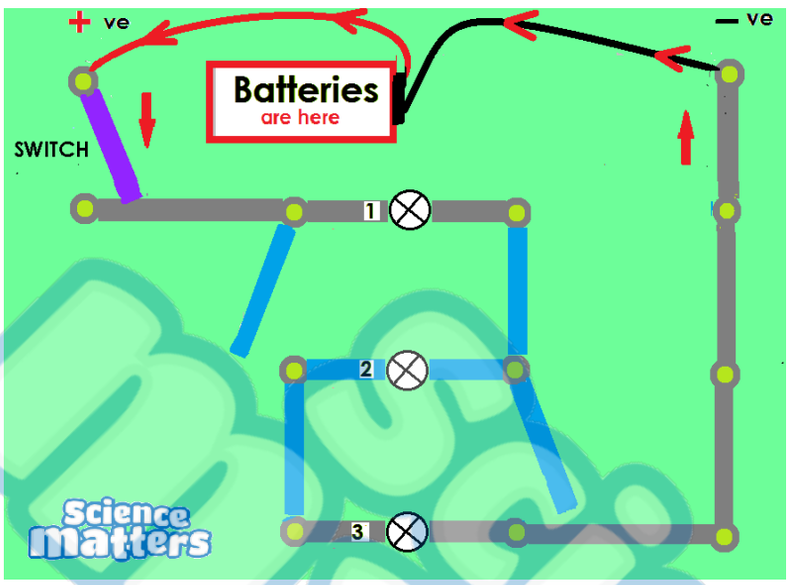
How many ways can the current flow around the circuit? _____

Loosen a bulb that is lit. What happens to the other one?

_____



3. Set up your circuit board as shown below.



Word Box

Bright	Light
Dim	Dimmer
Flow	Current
Go out	Gap
Stay on	Circuit
More	Less

Close the switch.

Which bulbs light up? _____

Again draw arrows to show the path taken by the current.

What happened to the brightness of the bulbs? Why do you think this happened?

The bulbs are _____ than before this is because there is _____ _____ flowing through the circuit.

How many ways can the current flow around the circuit? _____

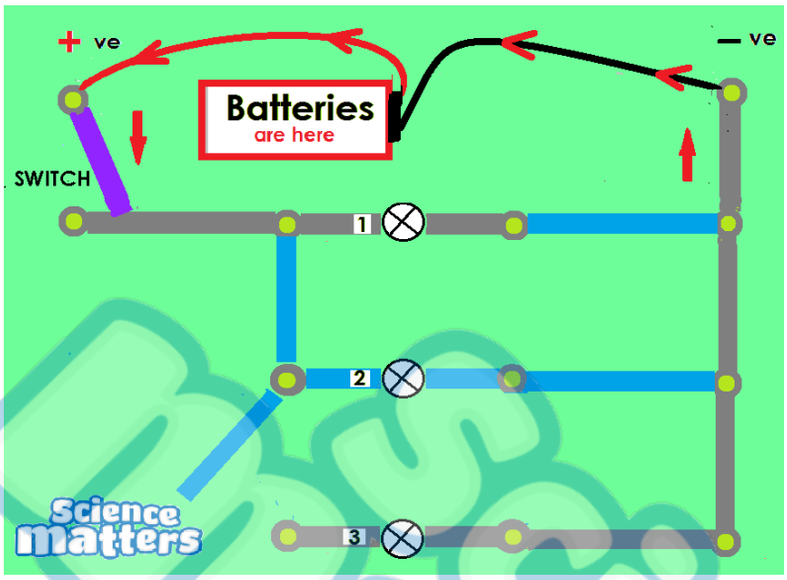
Loosen a bulb that is lit. What happens and why?

All of the bulbs _____ _____. There is a _____ in the circuit and no _____ can flow.

What would have happened if **many bulbs** were connected in SERIES?

The bulbs would be very _____ or will not _____ at all. There would be very little _____ flowing in the _____.

4. Set up your circuit board as shown below.



Word Box

Bright	Light
Dim	Battery
Flow	Current
Goes out	Gap
Stays on	
Less	More

Close the switch.

Which bulbs light up? Describe their brightness.

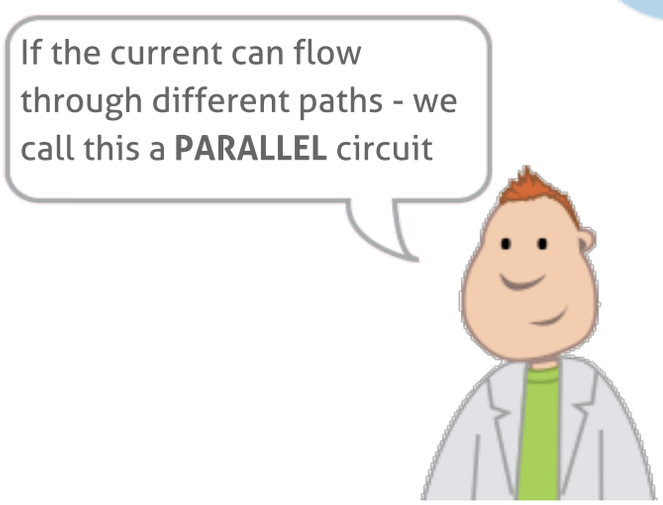
When the switch is closed bulbs _____ light up and both bulbs are _____.

How many ways can the current flow around the circuit? _____

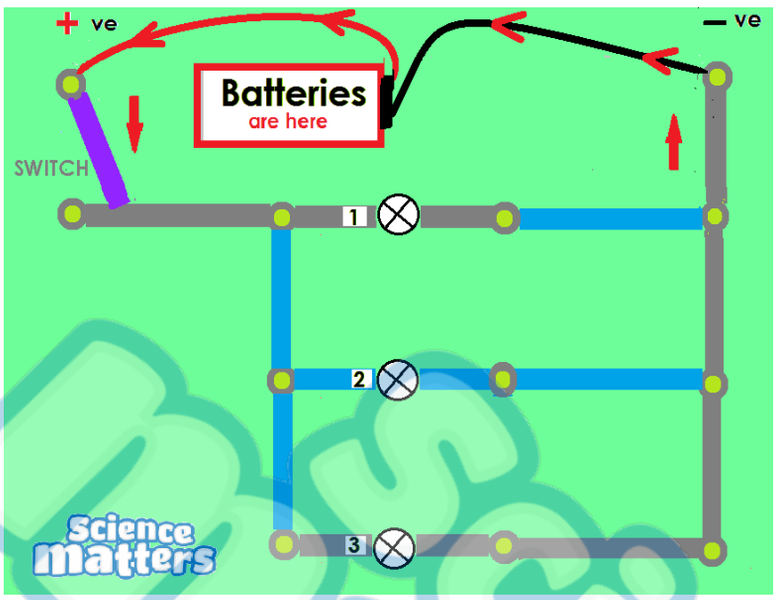
Again draw arrows to show the paths taken by the current.

Loosen a bulb that is lit. What happens and why?

The bulb that is loosened _____ _____ while the other bulb _____ _____ this happens because the current can still _____ through the other bulb and back to the _____.



5. Set up your circuit board as shown below



Word Box

Energy
Stay on Goes out
Run out
Flow through …
Dim / Bright

Close the switch.

Which bulbs light up? Describe their brightness.

When the switch is closed bulbs _____ light up and all the bulbs are _____.

How many ways can the current flow around the circuit? _____

Again draw arrows to show the paths taken by the current.

Loosen a bulb that is lit. What happens and why?

The bulb that is loosened _____ _____ while the other bulbs _____ _____ because the current can still _____

_____

What would have happened if many bulbs had been connected in PARALLEL? How would this affect the batteries?

In PARALLEL all the bulbs would be _____but the batteries would _____ _____ of _____ much sooner.

Think about the electrical appliances in your home. When one of them is switched off what affect does it have on the others?

_____

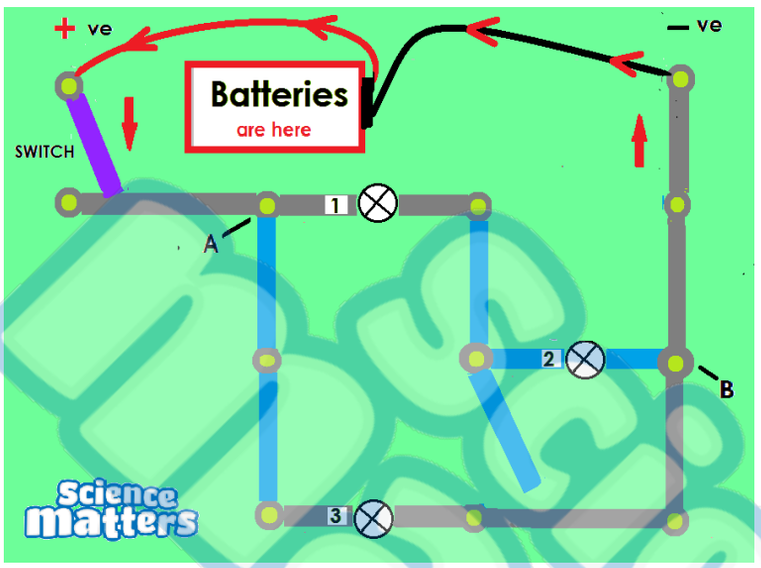
So in our home are appliances wired in SERIES or in PARALLEL?

_____

More Investigation

Set up and investigate these circuits.

1.



Word Box

Bright / Dull
Splits up
Most / Least
Current
Flows Joins up

Close the switch.

Draw arrows showing the path the current takes.

How do the brightness of the bulbs compare?

Bulb _____ is bright and bulbs _____ are both _____.

Why do you think bulb _____ is the brightest?

Bulb ____ is the brightest because it has the _____ _____ flowing through it.

What happens to the current at junction A and at junction B?

At junction A the current _____ _____and at junction B the current _____ _____ again

What do you think will happen if bulb 2 is loosened?

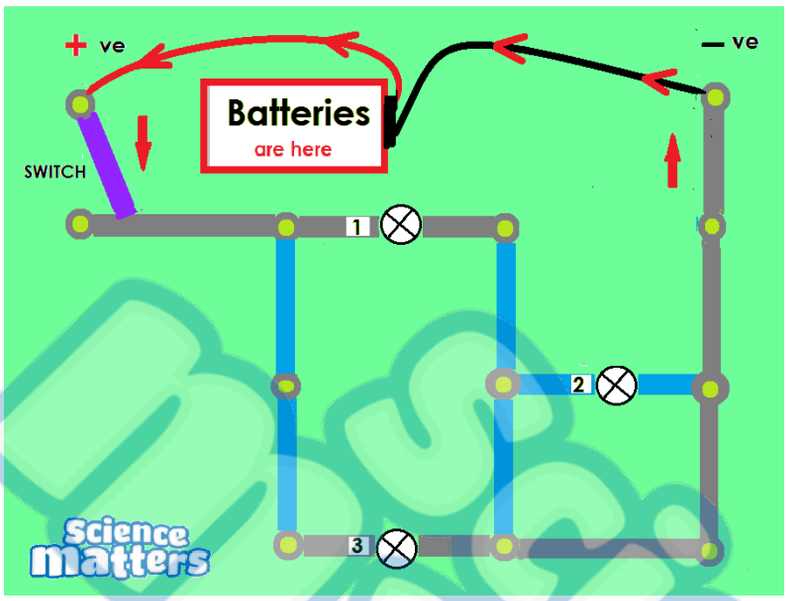
_____

What do you think will happen if bulb 3 alone is loosened?

_____

Check your answers.

2.



Word Box

The term - 'By passes' might help you with this one.

Close the switch.

Which bulbs light up? _____

Can you suggest a reason why bulb ____ won't light up?

_____

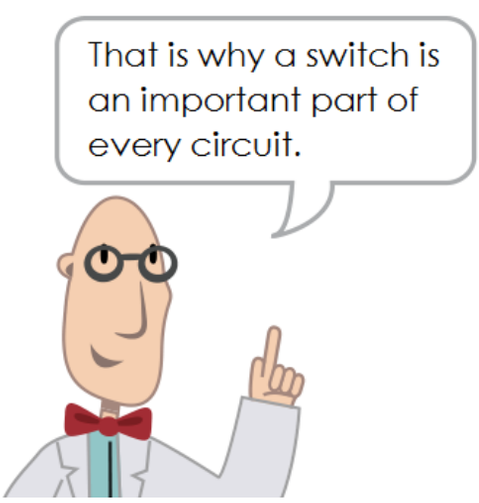
Draw arrows showing the path the current takes.

What do you think will happen if bulb 1 is loosened?

_____

Check your answer.

Also remember, in a circuit (or a part of the circuit) the current will stop flowing if there is a gap in it.



At every switch there is a gap in the circuit. The switch is used to close the gap so that the current can _____.

Conductors and Insulators

The parts that make up your circuit (bulbs, batteries, connectors etc.) are all good conductors.

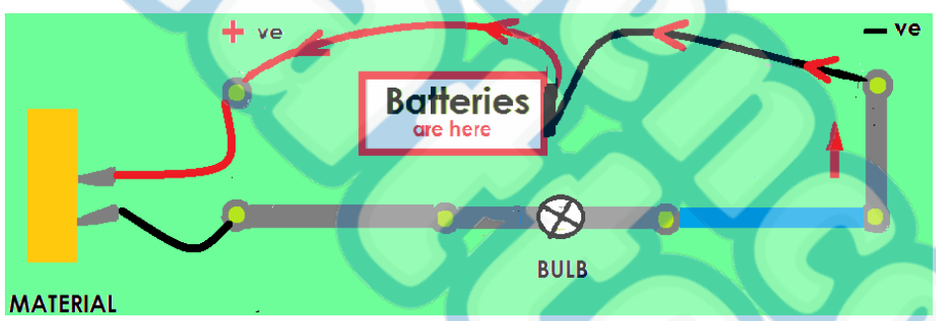
A conductor is a material which allows current to flow easily through it.

When electricity cannot flow through a material it is called an insulator.

Insulators won't let the current flow.

Test circuit

Set up the circuit below to test various materials to find out if they are conductors



How will you know if the test material is a conductor?

_____

Test the materials below and then complete the table.

Copper Wood Stone Aluminium Plastic
Cotton Pencil lead Iron Paper Tin

CONDUCTORS	INSULATORS

From your results complete the two sentences.

1. All metals are _____.

2. Graphite (pencil lead) is the only non - m_____ that is a _____ all other non - metals are_____.

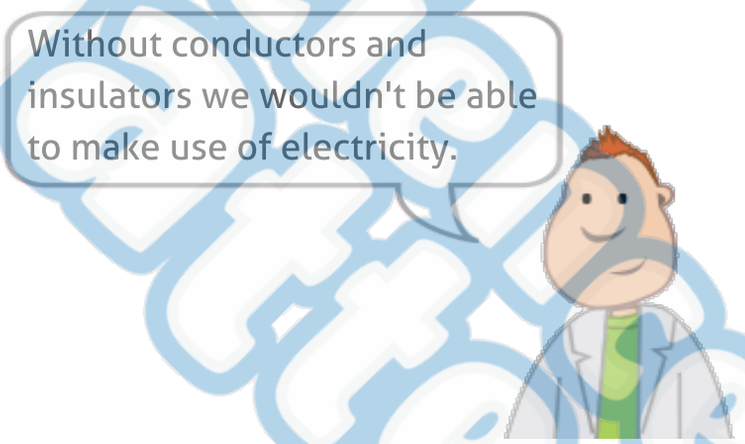
3. Give a reason why the electric cables around our homes are;-

a) made of copper? _____

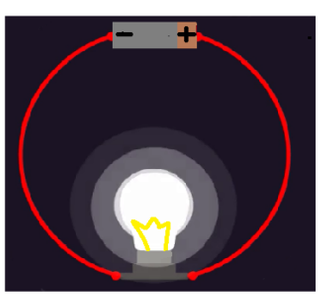
_____

b) coated with plastic? _____

_____



All electrical devices have circuits through which electric current flows.
Most times the electric current is used to make these devices:-

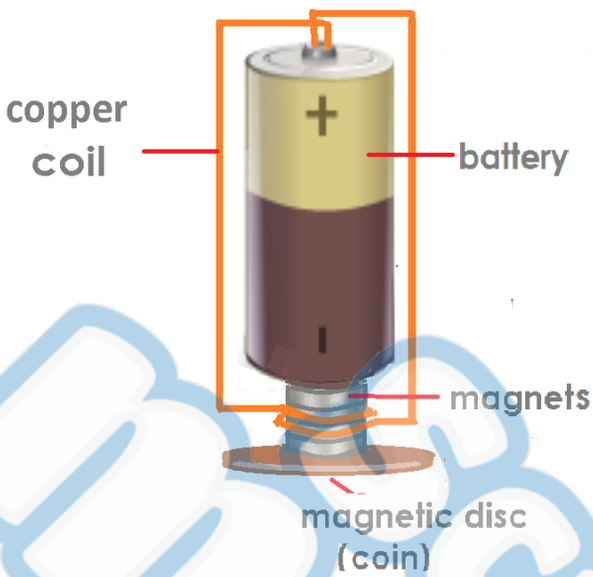


_____ up

_____ up

or _____

Demonstrating what electricity can do.



Assemble your motor.

What was the disc needed for?

_____

What 3 main parts are needed to make the motor work?

_____

_____

_____

What happens when the electricity is flowing through the motor?

_____

_____

Many electrical devices have motors in them and electricity is used to make them _____.

List some electrical devices that have motors:-

_____ _____ _____

Play safe

(visit www. nienetworks.co.uk/Safety-Environment/Kidzsafe)

Is electricity dangerous?

Yes it is! So, safe use is very important.

Safety matters - About the house and outdoors.

Electricity will flow naturally into the ground - through anything that will conduct the electricity - that includes **you**!

Electric shock can be FATAL.

So!

Stay away from exposed or dangerous electricity equipment.

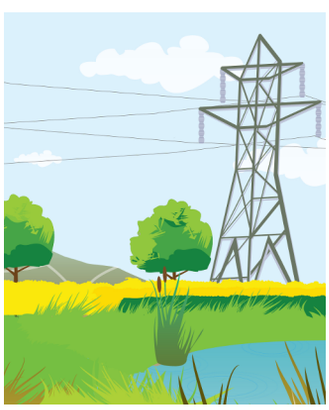
Never handle any electric appliances if they or your hands are wet.

Electricity Pylons and Substations are extremely dangerous structures.

Every pylon and substation have a yellow 'Danger of Death' sign to warn people of the danger of going close to them.

Overhead power lines are not insulated and therefore extremely dangerous.

Never fish or fly kites etc. anywhere near to these cables.



Images courtesy of NIE networks

Match each term below with the phrase(s) at the bottom of the page.

1 CONDUCTORS

2 BATTERY

3 SERIES CIRCUIT

4 ELECTRIC CURRENT

5 STATIC ELECTRICITY

6 PARALLEL CIRCUIT

7 INSULATORS

8 CIRCUIT

a) An energy source.

b) Objects that don't allow current to flow through them.

c) A circuit that has only one path.

d) Examples – Pencil lead, Copper.

e) Electrons on the move.

f) In this circuit if one bulb goes out the rest stay on.

g) Bulbs get duller when wired this way.

h) A circuit with more than one path.

i) Lightning is an example of this being released.

j) Pushes the current.

k) Provides the path for the electricity to flow.

l) Measured in Amps.