

Electrical Conductors and Insulators



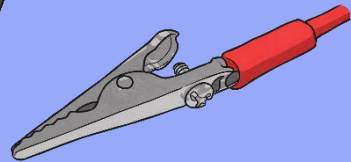
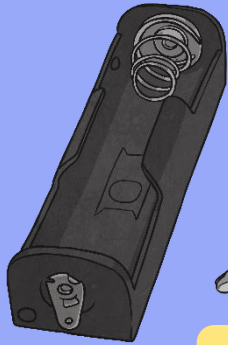
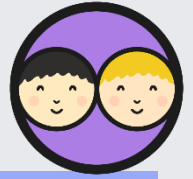
Aim

- I can identify and sort materials into electrical conductors or insulators.

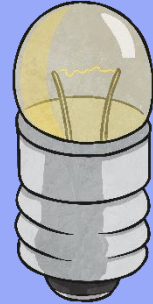
Success Criteria

- I can explain why some materials conduct electrical currents and why others don't.
- I can test materials to check if they are conductors or insulators of electrical current.

Parts of a Circuit

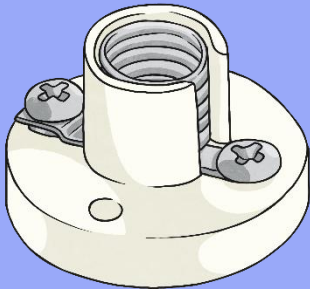


motor

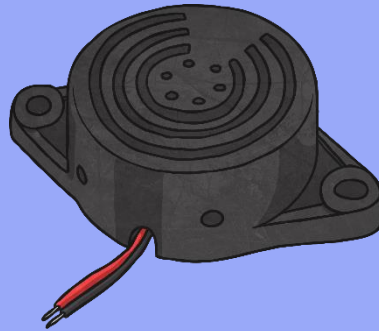


wires

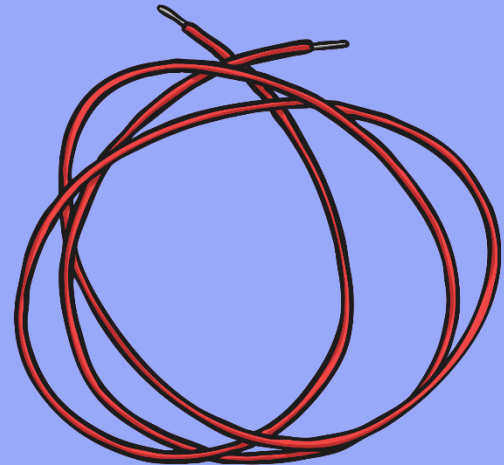
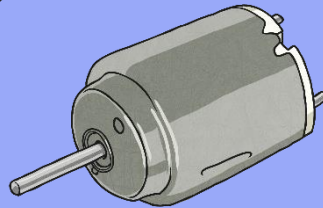
bulb



crocodile clip



battery (cell)

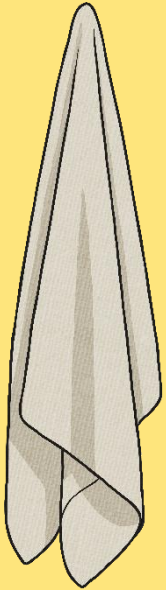


Materials



In your groups – look at the materials you have been given and label them.

What materials did you have?



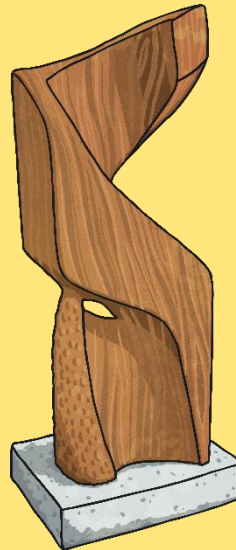
linen



plastic



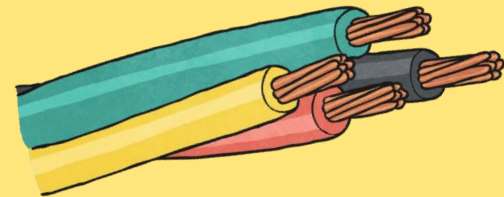
cupronickel



wood



wool

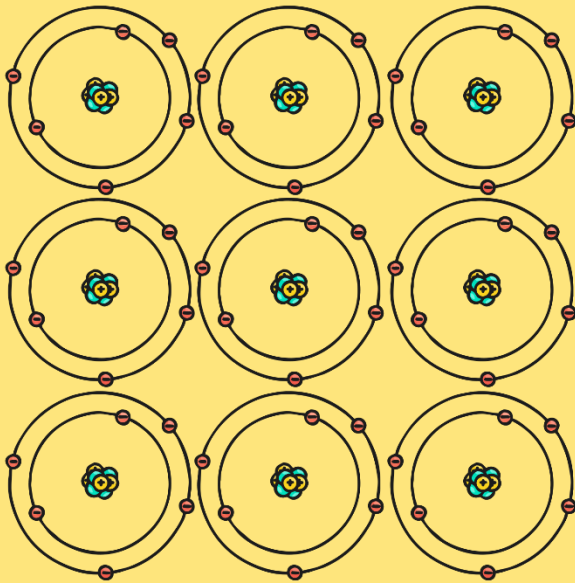


copper

Are there any materials you were unsure about? Which ones?

Insulators and Conductors

In most materials, the atoms look like this:



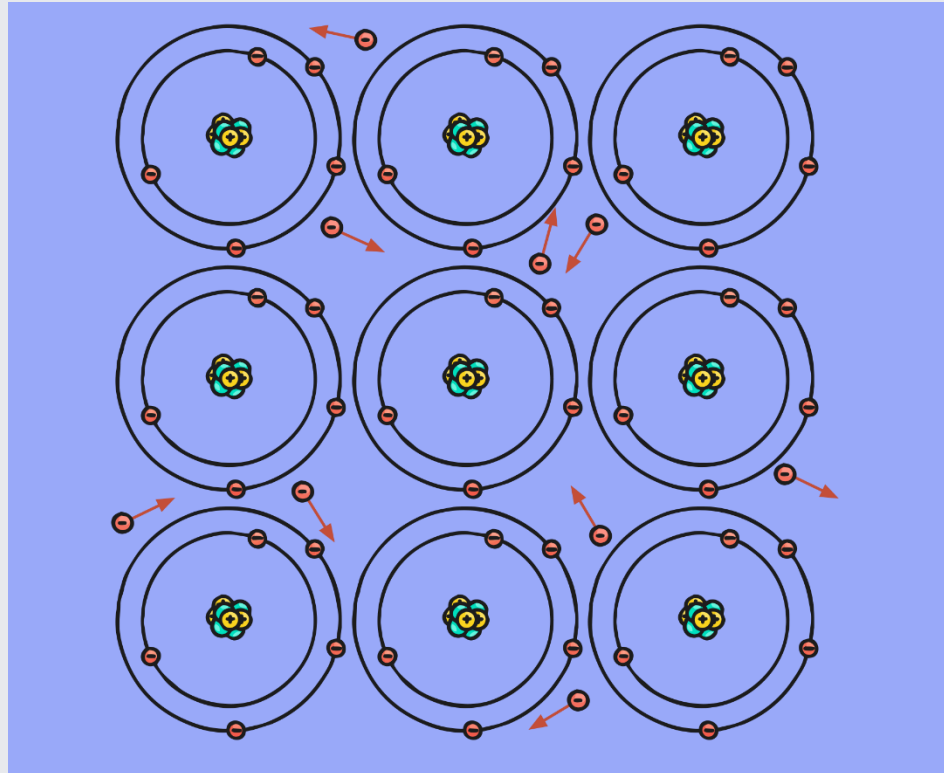
- The **protons** and **neutrons** are attracted to each other as a result of the **strong nuclear force**, and they form the nucleus.
- The **electrons** are attracted to **protons**, but this attraction is not as strong as the **strong nuclear force** which makes the **protons** and **neutrons** stick together.
- Instead, the attraction means that the **electrons** orbit the **protons** in the nucleus.
- The **electrons cannot move freely** in these materials and therefore no **electric current** can be produced.

These materials are called **electrical insulators**.

If you create a circuit which includes an **electrical insulator**, it will be **incomplete** (even if it looks complete!) as no **electrons** will flow through the material.

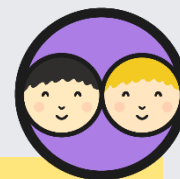
Insulators and Conductors

- In some materials, some of the **electrons** are **free electrons** and can move.
- If you create a circuit with these materials, the **free electrons** can be made to move in one direction, creating an electric current.
- These materials are called **electrical conductors**.



N.B. If the circuit has not been set up correctly, then the electric current cannot flow, even through a conductor. Ensure that you check that you have connected all parts of the circuit together.

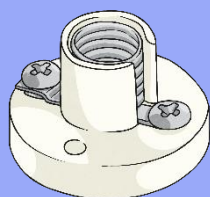
Testing Materials



Before you start to test materials to identify if they are conductors or insulators, first create a complete circuit using the following parts:



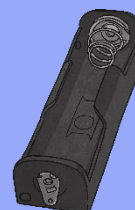
bulb



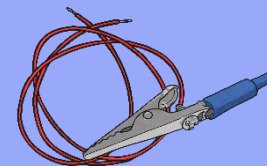
bulb holder



battery (cell)



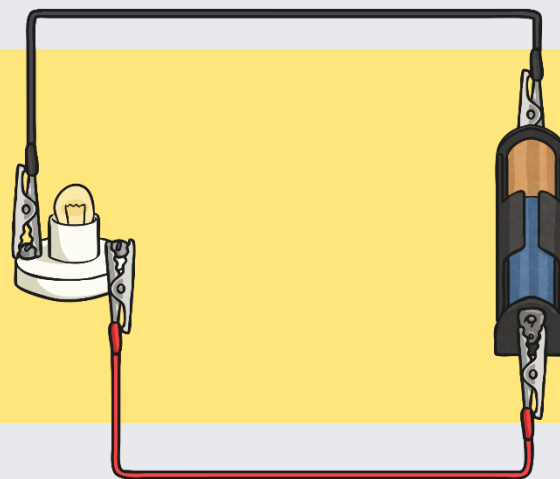
battery holder



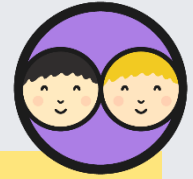
3 wires and crocodile clips

The circuit should look like the one on the right when complete.

N.B. check that it works and the bulb lights. If the bulb is dim in this circuit, change either the bulb or the battery.

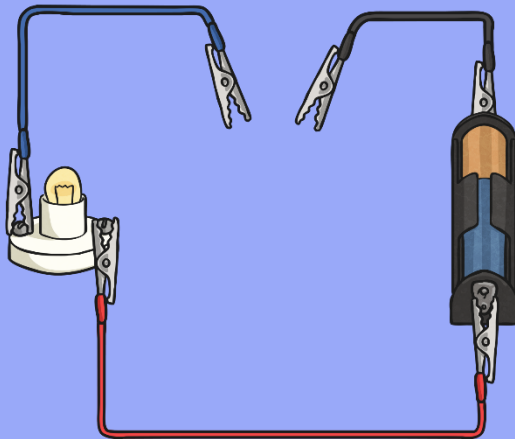


Testing Materials

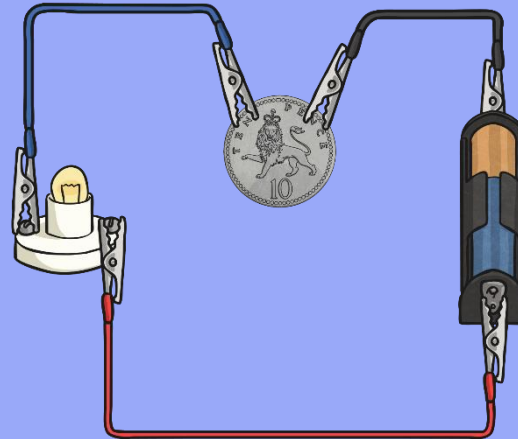


You will need one additional wire.

Connect it to your circuit so it now looks like this:



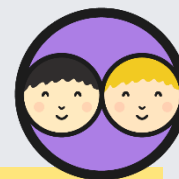
Choose a material and add it to the circuit so it looks like this:



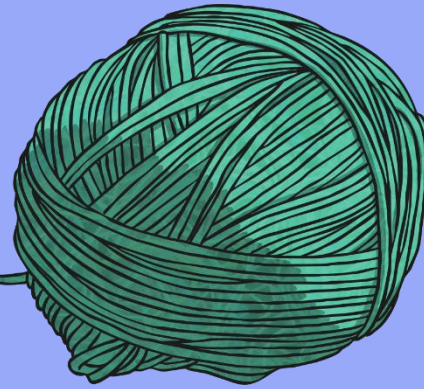
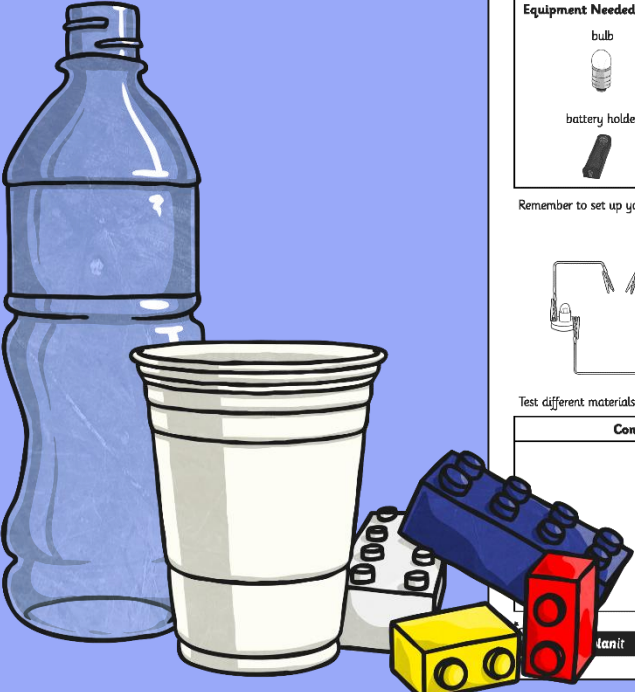
If the **bulb lights**, then the material is an **electrical conductor**.
If the **bulb remains unlit**, the material is an **electrical insulator**.

N.B. Check that all parts of the circuit are connected properly.

Testing Materials



Record your findings on the **Insulators and Conductors Activity Sheet**.

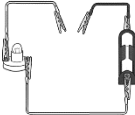


Insulators and Conductors

Equipment Needed:

- bulb
- bulb holder
- battery (cell)
- battery holder
- 3 wires with crocodile clips

Remember to set up your circuit like this:



When you add the material to test if it is a conductor or an insulator, it should look like this:

Conductors	Insulators

Test different materials and record findings in the table below:

twinkl

Science | Year 4 | Electricity | Conductors and Insulators | Lesson 4

Testing Materials: Results



Conductors	Insulators

Aim



- I can identify and sort materials into electrical conductors or insulators.

Success Criteria

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