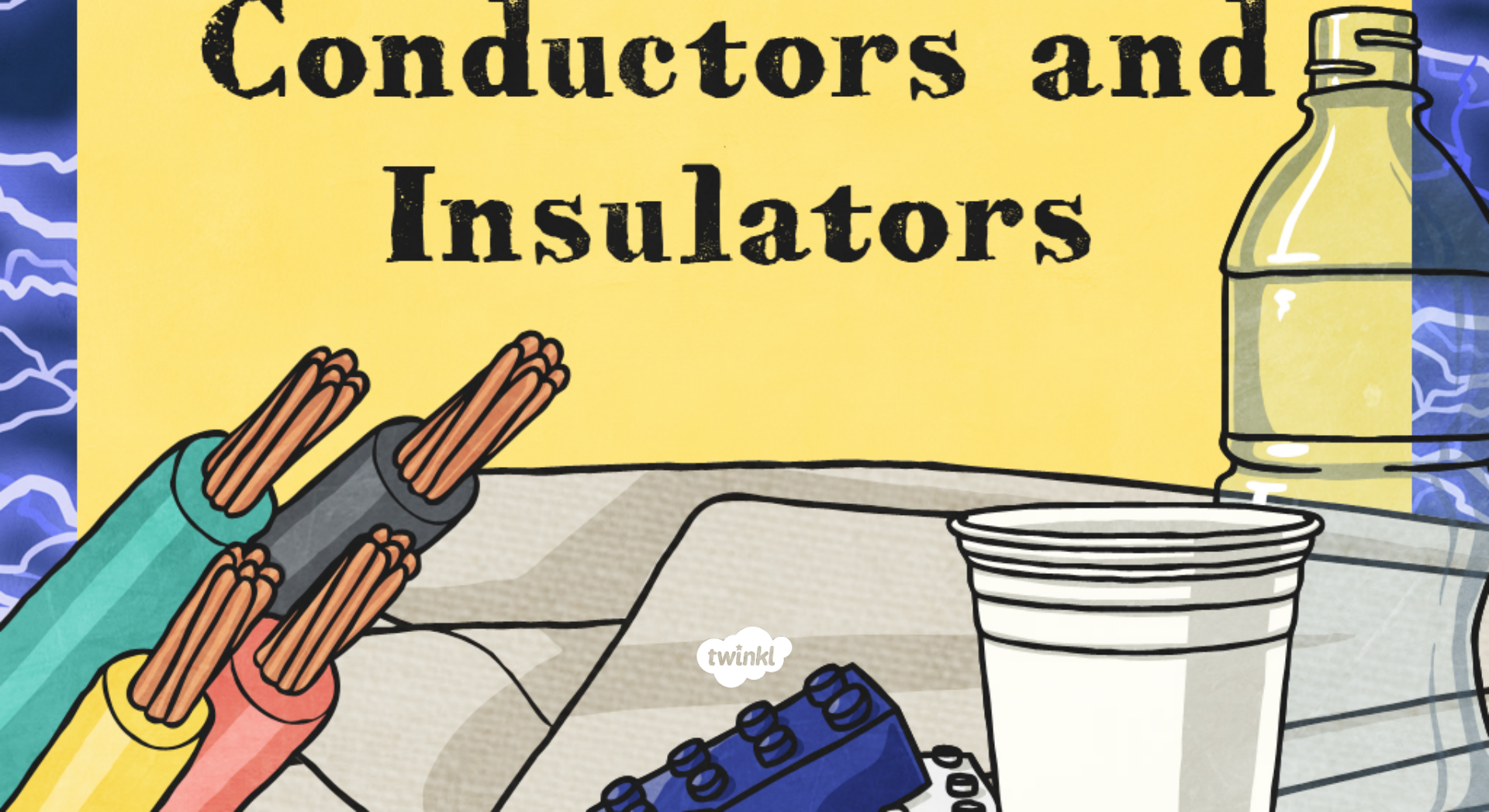
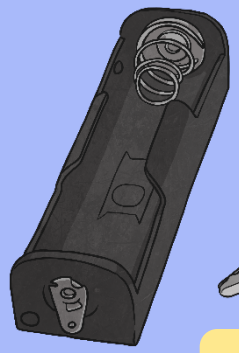
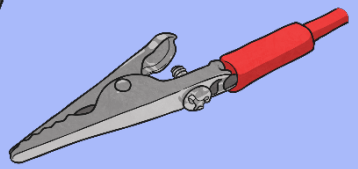
Electrical Conductors and Insulators



Can you match the labels to their parts?

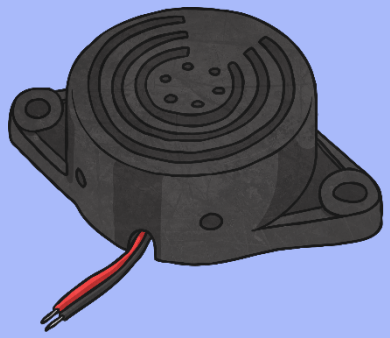


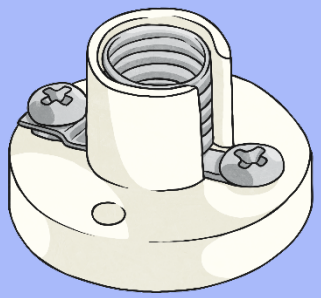


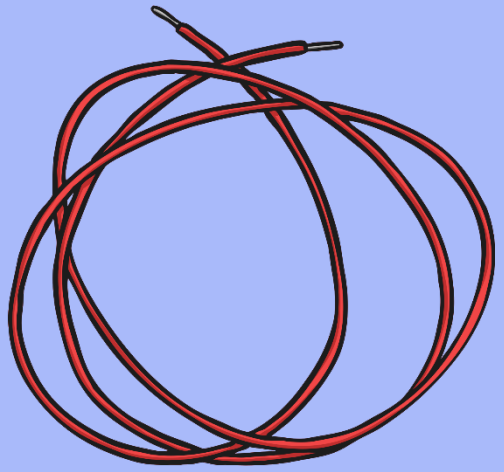
motor

wires

bulb

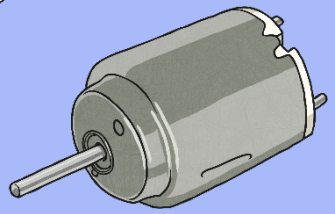






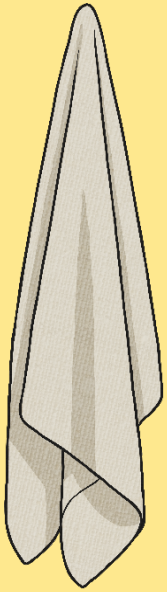
battery (cell)

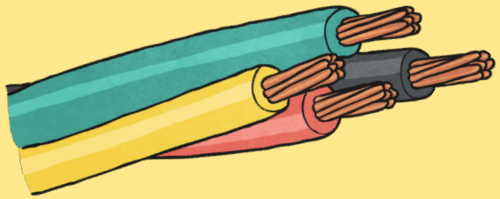
crocodile clip



Materials

It is important to be able to name materials accurately when considering ‘conductors’ and ‘insulators’. Can you name all of these materials?

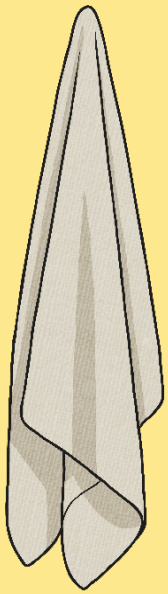




Are there any materials you were unsure about? Which ones?

Materials

What materials did you have?



linen

plastic

cupronickel

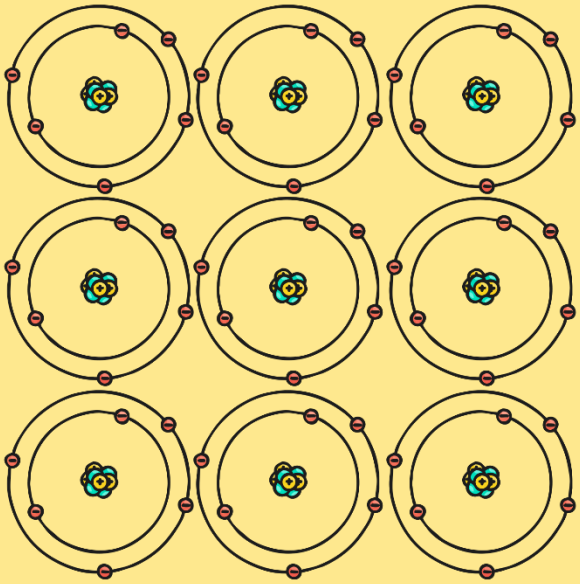
wood

wool

copper

Insulators and Conductors

In most materials, the atoms look like this:



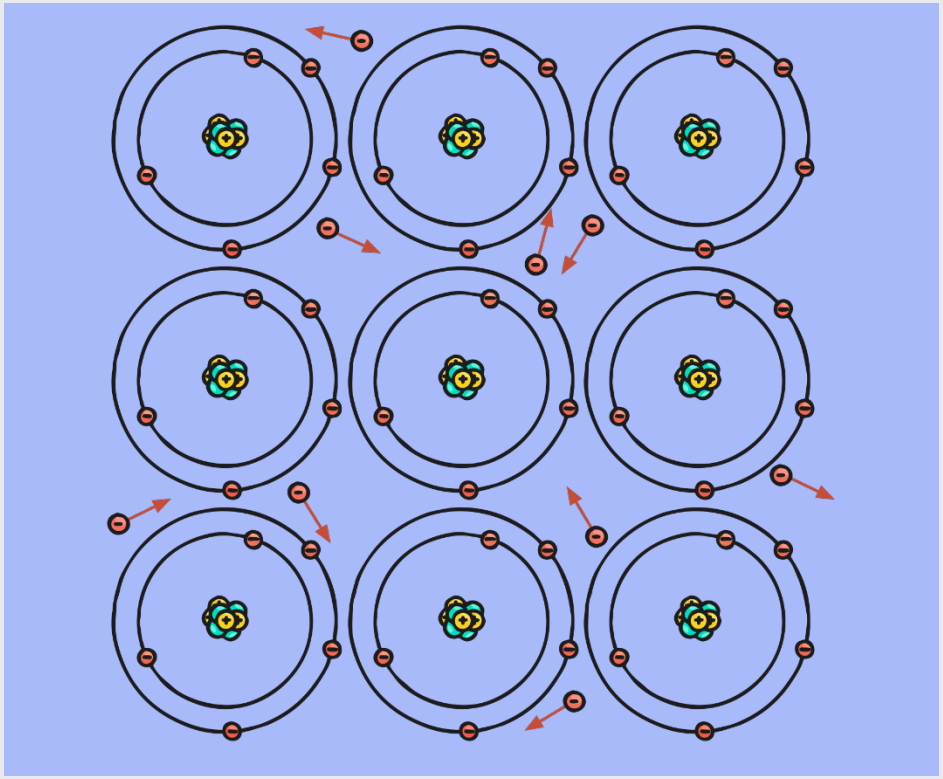
- The **protons** and **neutrons** are attracted to each other as a result of the **strong nuclear force**, and they form the nucleus.
- The **electrons** are attracted to **protons**, but this attraction is not as strong as the **strong nuclear force** which makes the **protons** and **neutrons** stick 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

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.**



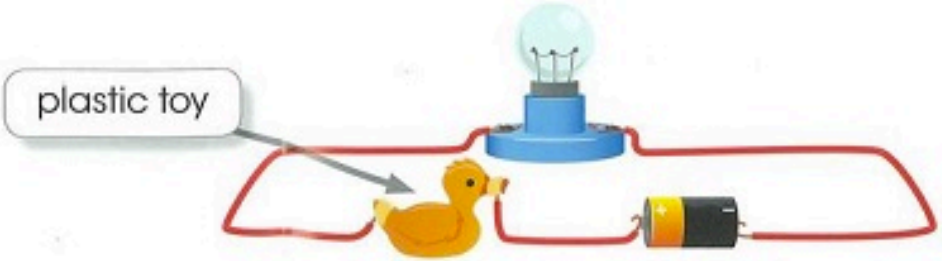
N.B. If the circuit has not been set up correctly, then the electric current cannot flow, even through a conductor. Ensure that you check that you have connected all parts of the circuit together.

Insulators and Conductors

An electrical current flows through some materials. These materials are conductors.

Steel is a conductor.

An electrical current doesn't flow through other materials. These materials are insulators.



Plastic is an insulator.

Insulators and Conductors

5 Electrical Conductors


silver


gold


copper


steel


sea water

5 Electrical Insulators


rubber


glass


oil


diamond


dry wood

What do you notice about materials that are conductors? What do you notice about materials that are insulators? Using this ‘guesswork’, what other materials might be conductors or insulators?

In my house, I have…

Conductors	Insulators