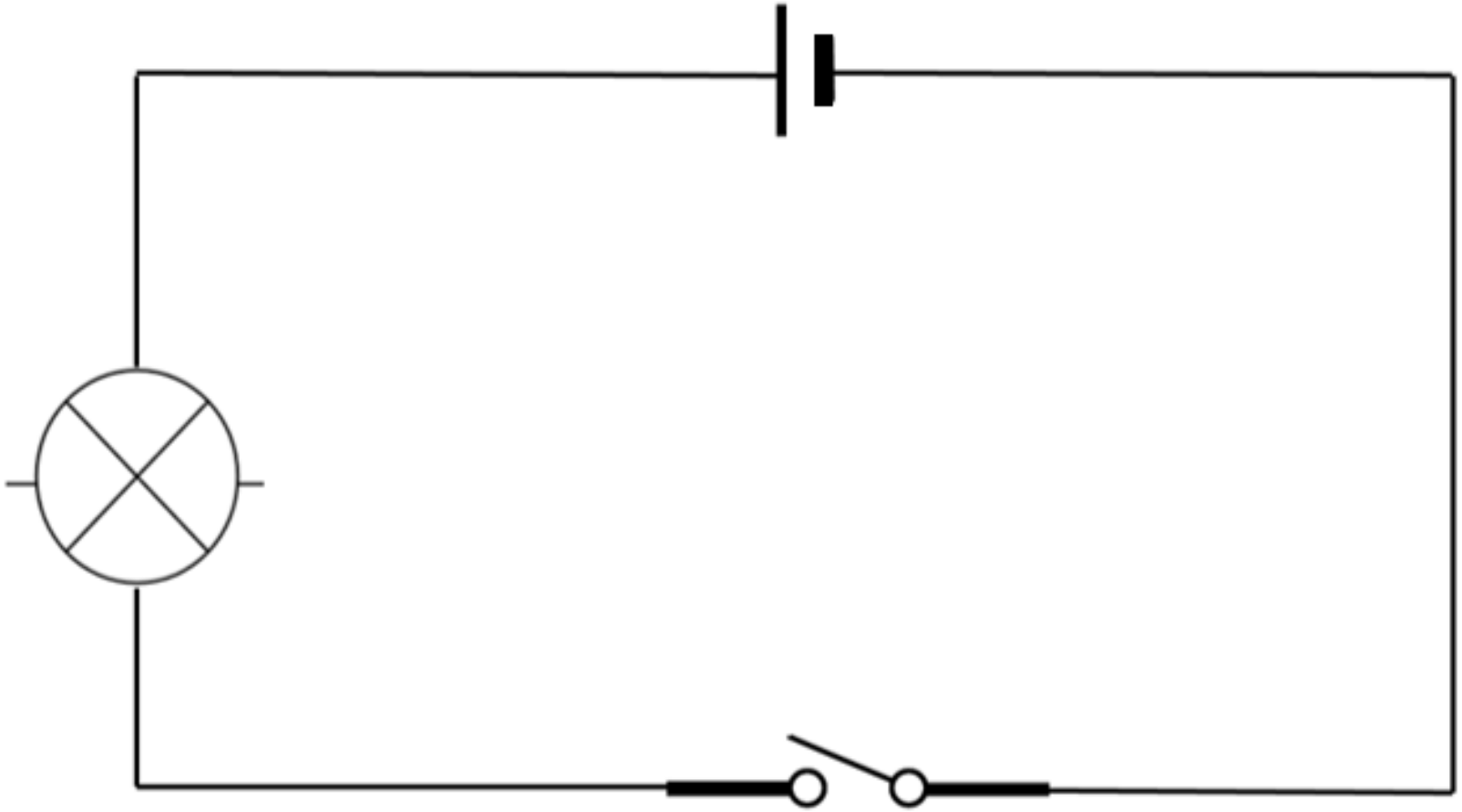
Science – Year 3/4B Summer 2

Electricity

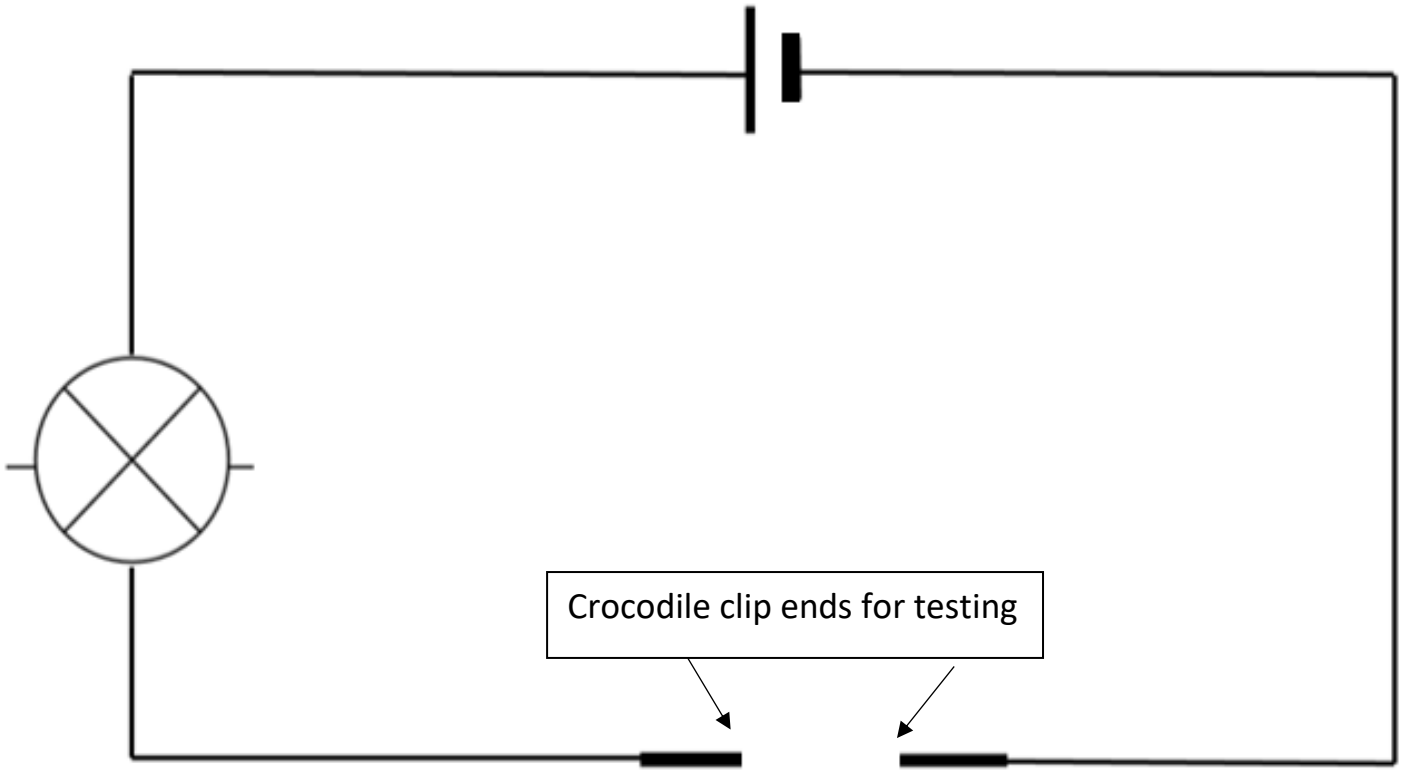
Electric Personalities

Session 3

Resource Pack



Test Circuit for Electrical Conductors and Insulators



Name:

I can test materials for electrical conduction and record my findings

Conductors and Insulators

Object	Material	Conducts Electricity	Insulates Electricity
Scissors	Metal (blade)	✓	
Scissors	Plastic (handle)		✓

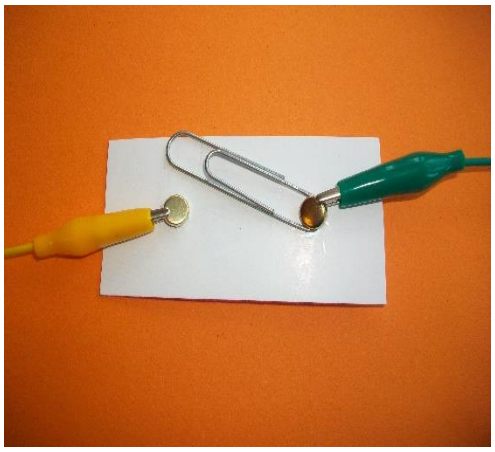
Conclusions

Look at your results table. What do you notice? What have you learnt about materials that conduct electricity and those that do not? Write your discoveries below.

Session 3 Teachers' Notes

Making a simple paperclip switch

During this session the children will be introduced to the concept of a switch. This homemade variety is perfect to demonstrate the simple idea of a device that can connect and disconnect a circuit at the touch of a paperclip! You will need to make one before the session to demonstrate. In later sessions the children may choose to make their own.



You will need: A small rectangle of card, 2 split pins and a metal paperclip (do not use the colourful coated type as the coating is not a conductor of electricity so the switch will not work)

Instructions: Make 2 holes in the card slightly closer together than the length of the paperclip. Insert the split pins into the holes and pull back the pins so they fit tightly. Hook the paperclip over one of the split pins so that it is under the head of the pin and touching the neck beneath. Connect 2 leads from a circuit to the pins so that the paperclip becomes the switch.

Items for testing conductivity

During this session the children will work in pairs to discover which materials conduct electricity and which do not (insulators). There will be plenty of items of different materials around the classroom that can be tested - wood, plastic, card, paper, glass, rubber and metal for example. You will want the children to test enough different materials that they can begin to draw conclusions so for this reason you may wish to gather a few items together that you would like them to include. Here are a few points to bear in mind:

- All metals conduct electricity so to help children draw this conclusion for themselves it would be helpful to provide a range of metals for testing, e.g. aluminium foil, iron nails, stainless steel spoons, copper cookware, silver (or silver plated) jewellery, coins, tin cans etc...
- Try to include some metals that are coated in plastic, paint or lacquer as hopefully through investigation the children will discover that these materials insulate - even a thin layer is enough to break the circuit. Good examples are coated paperclips or bulldog clips. You may have painted radiators in the classroom or lacquered door handles which will provide the same challenge.
- Graphite also conducts electricity so provide the children with some well sharpened pencils. The best conductors are the softer drawing pencils, e.g. 4B, 5B, 6B etc.as they have a higher graphite content but HB and B should still conduct the current effectively. Select pencils that have the "lead" exposed at the end so children can hold their wires to opposite ends. You could consider sharpening a couple of pencils at both ends because this will enable the children to make two crocodile clip connections. If you have any art graphite sticks you could include some of these for testing too. Children may conclude that the pencil contains lead (the metal) so it is important for them to know that pencils are made of graphite which is not a metal.

- Liquids can conduct electricity. Water is a poor conductor but salt water is a fairly good conductor. You could include cups of water and salt water for testing or leave this for a plenary demonstration as suggested in the session plan. If you do use liquids it is very important that you stress that it is only safe to do this with batteries. **If you use mains electricity to experiment with liquids it could kill you.** Remind children of the safety rules for using electricity that they learnt in Session 1. If you are planning to use water either for the investigation phase of the session or the plenary, try it out yourself first. The effect is a bit temperamental for various reasons but the following will help: make sure the water is completely saturated with salt and make sure you have plenty of power in your battery (or even connect more cells to make the current stronger).

Collecting recycled resources

Hopefully you have been collecting a large supply of recycled packaging over the past few weeks as next session you will need to have enough for everyone to explore and plan what they will make for their electric personality. If necessary put out a plea to parents and colleagues so that by next session you have enough to give children plenty of choice. It is also a good idea to ask each pupil to bring in a strong carrier bag which can be named, ready to keep all the elements of their project together when they begin to design next session. You could also do with a number of wire coat hangers.