Science - Year 3/4B Summer 2

Electricity

Electric Personalities

Session 5

Game and Teaching PowerPoint

This is a team game to test your knowledge of electricity.
It is called …

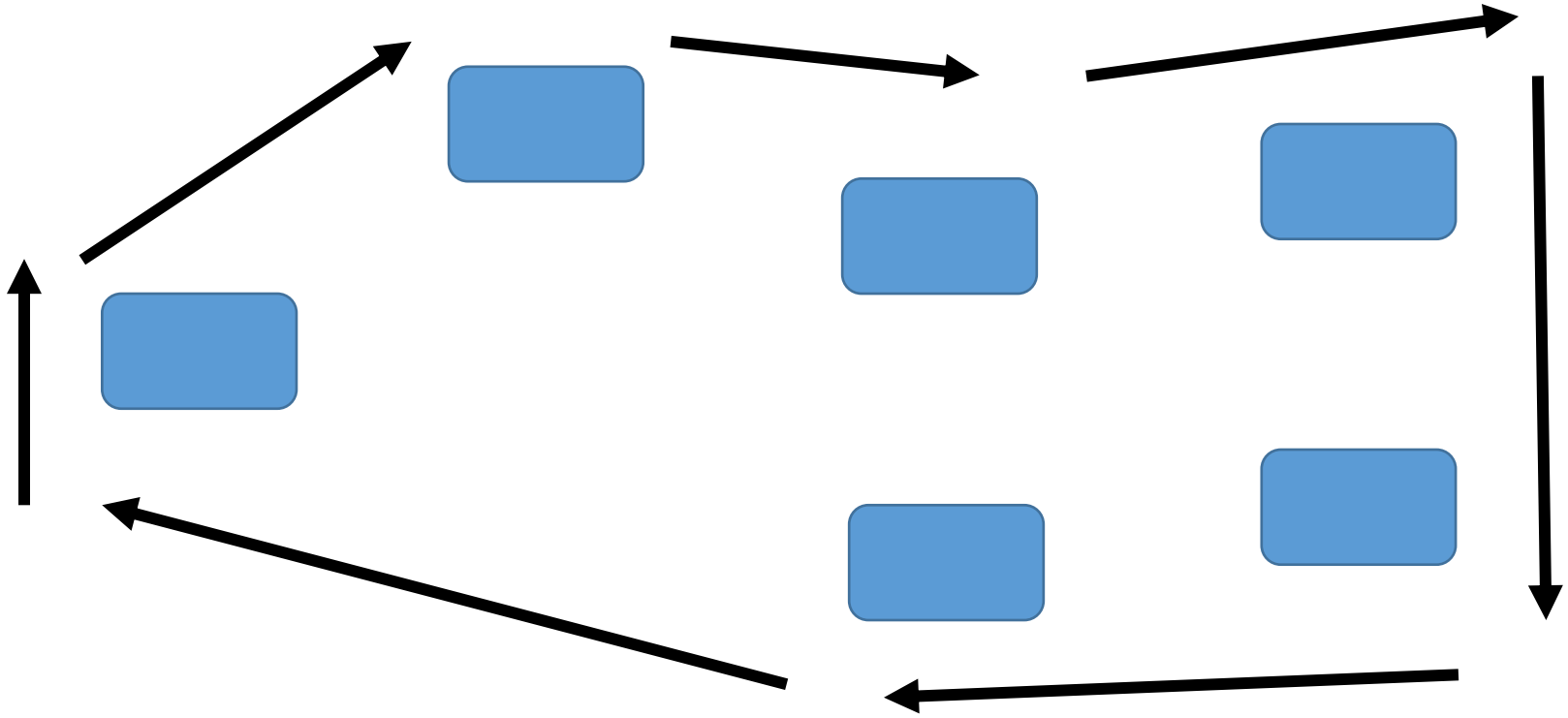
Loop the Loop

All your team needs is a playing sheet and a dice

6	1	2	3	4	5	6
A single unit that converts chemical energy into electrical energy is called a …	A material that does not conduct electricity is an …	If a bulb goes out by mistake on your circuit, you must find the break in the wires and …	This is the name given to a flow of electricity	Electricity can be dangerous if you forget the safety rules. Another word for dangerous is …	When you were given a heap of electrical components and asked to light up a bulb, you needed to …	This person was a scientist who invented more than 2000 electrical devices

The playing sheet has 7 clues.
Your job is to collect 7 answer slips – one for each clue

Your teacher will give each team a base and show you the route around the bases that makes a loop. When the game starts, players will collect answer slips by travelling around the loop in a clockwise direction. The answer slips will be scattered on the floor between the bases.



How to play Loop the Loop

- When your teacher says “Go!” one person on each team will roll the dice. Together read the clue that matches the number on the dice. If you roll a 6, read the first clue. Discuss what the answer word might be.

- The person who rolled the dice should then set off round the loop looking for an answer slip that fits their clue. When they find the word they think is right, they should continue walking right round the loop (even if they have only just left their base so they are very near it)

- When they bring the answer slip back to their base, the team should check that it is the right answer. If it is, they should place it over the top of that clue and pass the dice to the next person in the team. If the answer is not correct for that clue, the team must discard it (put it on the floor on either side of your base so that someone else may collect it as they come round the loop). Then pass the dice to the next person.

- When the next person rolls they should read the matching clue, discuss the possible answer and set off walking round the loop to find it as before. Play continues in this way.

- If anyone rolls the number of a clue that already has an answer they must pass the dice on to the next player in the team. This continues until someone rolls the number of a clue that is still needed.

- You will notice that 2 clues have the number 6 above them. This means you will need to roll a 6 twice.

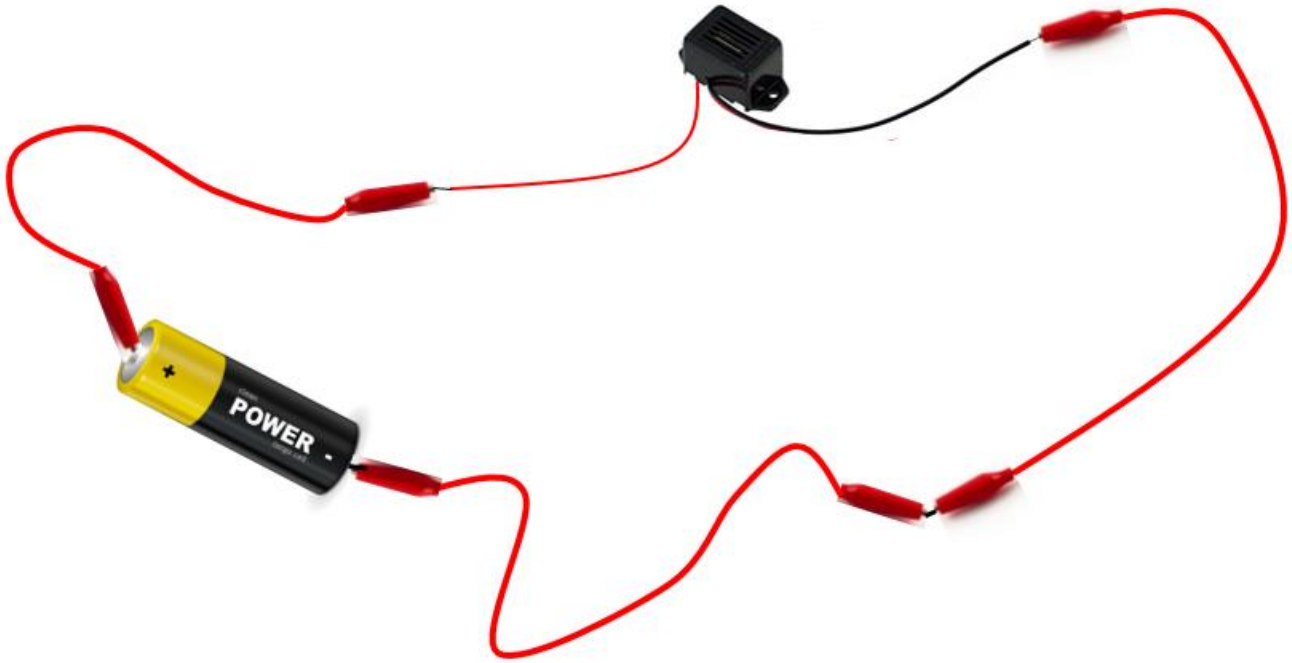
- The first team to collect all the answers (in the correct places) wins the game. They should call out the Magic Electrical Word created by the first letter of each answer

Golden Rules

- No doubling back – always continue walking round the loop
- No running or treading on the answer slips
- Always put wrong answers back into the loop (not on your clue sheet)
- Even if you guess it, you must not call it out the Magic Electrical Word until you have collected all the answers

Let’s play Loop the Loop!

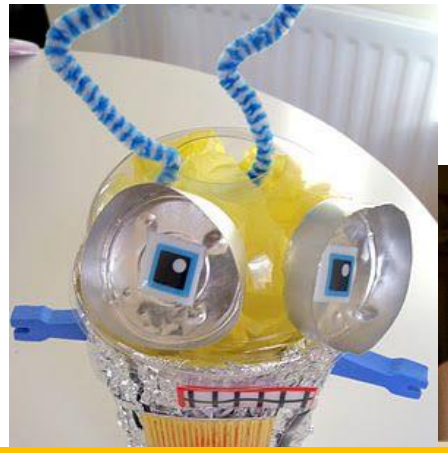
Congratulations to the winning team and to everyone else as well for your expert knowledge on electricity



Did you notice that the way you all travelled around the loop was just like an electric current travelling around a circuit.

It’s as if you were the electrons travelling along the metal wires and the bases were the components.





Now it is time for you to begin making your Electric Personality.

Begin by looking at the plan you made last session.

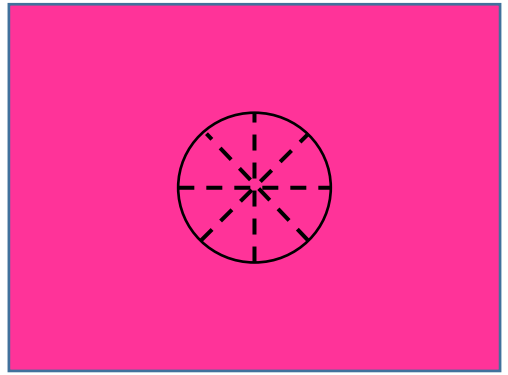



Begin by connecting the main sections of the body together. There are different ways you can do this and you will need to think about which joining method will work best for your model. Here are some ideas to help you:

A flat cardboard surface will stick well to another cardboard surface with PVA glue. Remember you will need to be able to open the body to put in your circuit so you may need to cut a door or opening in the box before you stick them together.

Tubes for arms and legs can be pushed into holes that are just the right size like these little bottles (that once had a yogurt drink in them).

Draw round the circular end of the tube in the place where it will go. Then draw 4 lines through the centre and ask a grown up to help you slit along the lines with a craft knife. The tube can then be pushed through to make a tight, neat connection.



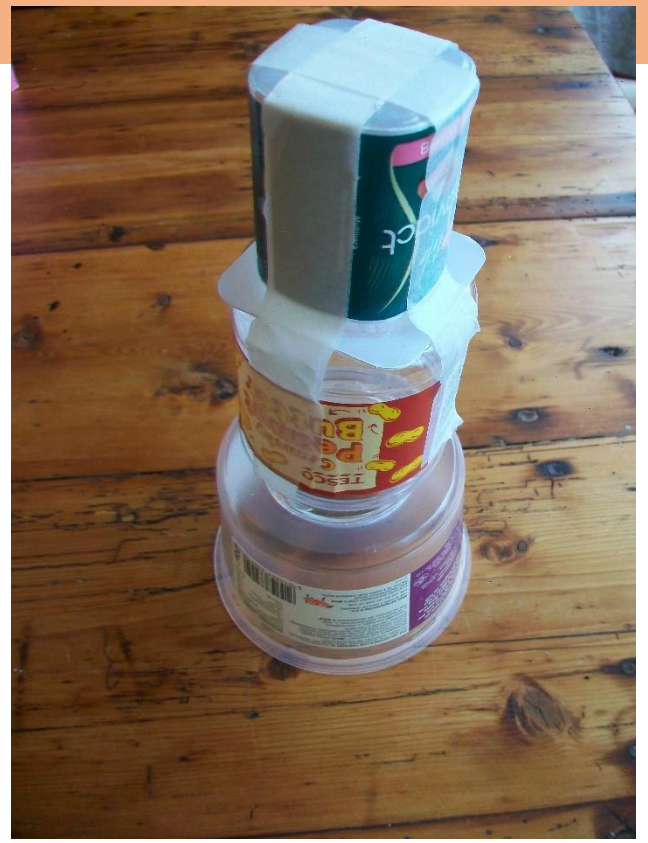
Here the same thing has been done with a cardboard tube and a shoebox.

Both these models use a plastic yogurt pot. Plastic can be a bit harder to join than cardboard. But if it has a wide rim like the one below and you are sticking it onto cardboard, then PVA glue should attach it firmly.

Just make sure you leave the glue plenty of time to dry.

If the pot you want to use has a narrow rim like this plastic jar, or if you want to stick two plastic items together, you may need to use a hot glue gun. Your teacher will explain your safety rules for using this.

Here 2 plastic pots have been joined by inserting the rim of the top one into a hole in the bottom one. The hole was made just the right size using the same “draw round and slit” method as before. But then the little triangles inside the hole were cut away with scissors because plastic does not bend as easily as card.



Alternatively it is easy to join 2 pots together using strips of masking tape. This type of tape is much better for joining than usual sticky tape as you will be able to paint over it later when you finish off your model.

Once you have constructed the body of your personality, you will need to begin work on your electric circuit.

First think about where you will place your battery. Try to make it somewhere inside, in a place that you can reach fairly easily. You could make a little shelf for it using another box or tube.

Next think about where the switch should go. Ideally this should be somewhere on the outside of your model – perhaps at the side or the back. The wires will attach to it on the inside (out of sight).

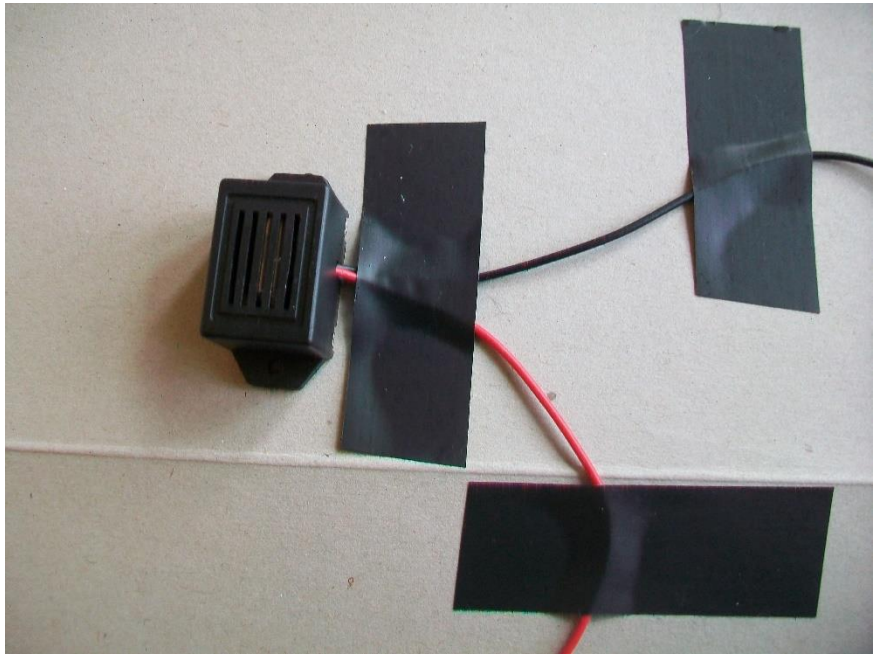
Here are the split pins from the paperclip switch. They have been pushed through to the inside of the box and connected into the circuit.

To make Light Up Eyes

Draw a face for your personality on card and make bulb sized holes for the eyes. The face is probably going to be attached to a box or pot that will be the head so you will need to make holes in this too. Hold your cardboard face in the right place on the head and mark the place where the eyes should be. Then put a blob of sticky tack behind the mark and push through with a sharp pencil from the front. Do this for both eyes.

Now glue the face to the head so that the eye holes line up and gently push a bulb into each hole from the front.

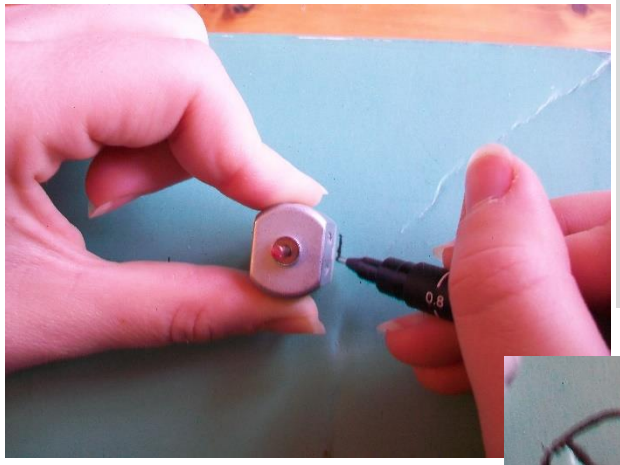
Finally, screw in the bulb holders from the back. They are now ready to attach your wiring.



To use a Buzzer

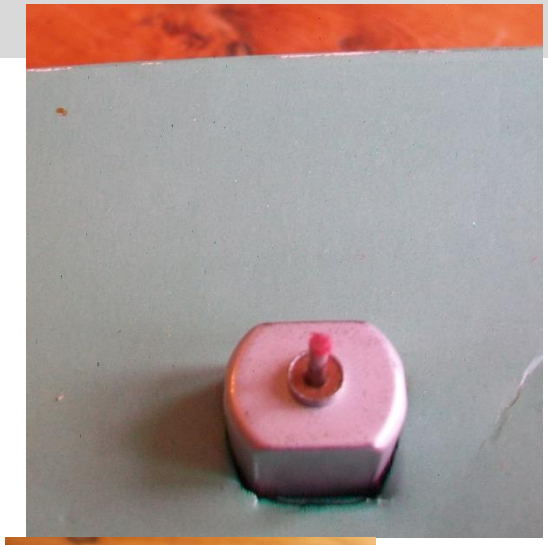
The buzzer will be hidden inside your model. Choose a place where you can safely tape it onto a horizontal surface. Avoid putting tape over the top of it as this may muffle the sound.

Remember that a buzzer can only be wired one way. Make sure you have made a note on your plan of which wire goes where. Don’t worry if you are not sure, you can check it out once again with crocodile leads before you begin wiring up the circuit for your model.

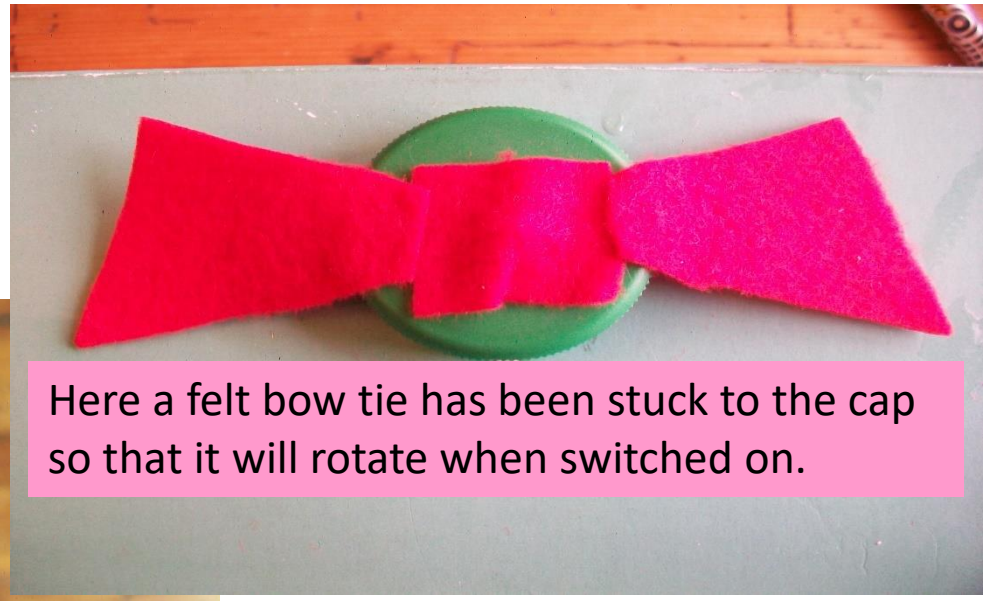


To Use a Motor

You will need to mount the motor on your model so that the revolving pin sticks outwards. The best way to do this is using the “Draw round and slit” method from before. Decide where you want the motor to be and draw round it as tightly as you can. 2 slits will probably be enough as the motor is so small.



Then push the motor gently into the hole from the outside so it is half in and half out. You may want to hide the front of your motor by using the cap from a bottle. Make a hole in the centre of the cap by pushing the point from a pair of compasses through into a blob of sticky tack behind. If the pin fits very tightly, the whole cap will turn which may help you.



Here a felt bow tie has been stuck to the cap so that it will rotate when switched on.

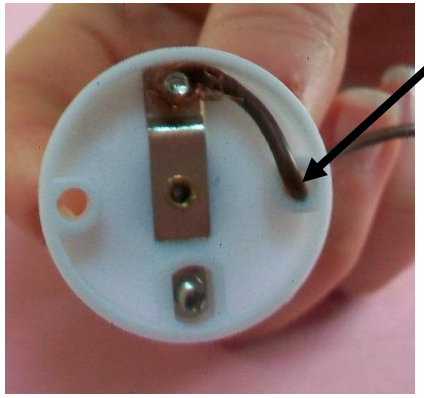
Here some revolving antennae have been made from a pair of wooden forks that have been taped together. The taped end fits tightly over the pin.

Here the forks have been pushed tightly over the pin the other way round so that they will rotate in a giant circle.

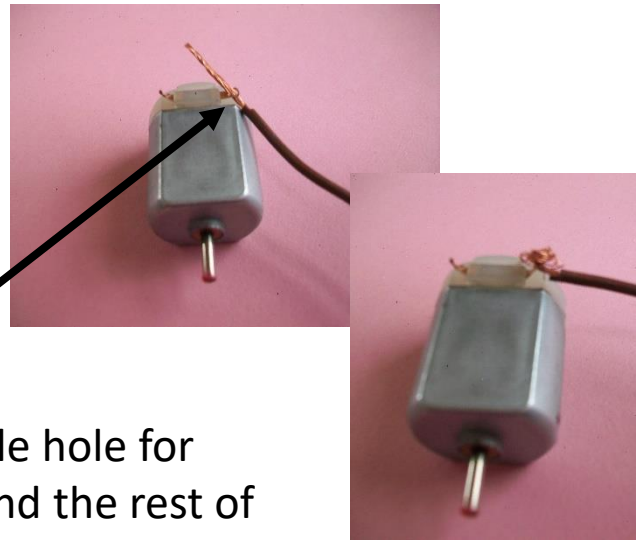
Wiring Up Your Circuit

The electrical circuit inside your model needs to be strong and secure so instead of using crocodile clip leads that can slip off, you will be making your own electrical connections.

Use leads with 2 cm of bare wire showing at each end. Twist the wires slightly to make a neat pointed end then carefully wind the wires around the connection point to make a really tight join. You can put a little piece of plastic tape over it to keep it even more secure.



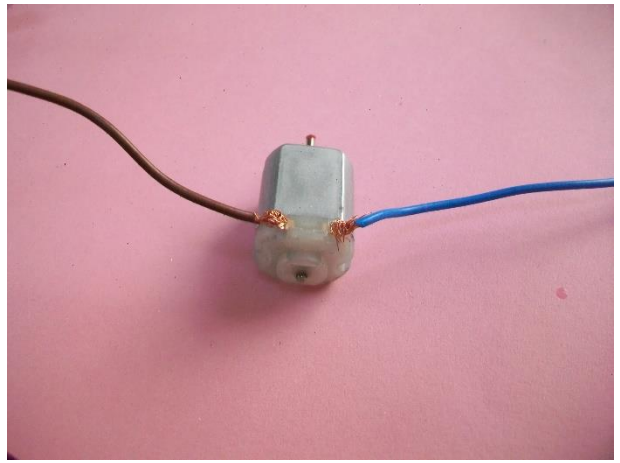
Some components have features to help with the wiring. This bulb holder has a hole to feed the wire through and a narrow gap between the point and the rim that squashes the wire against the metal point to make a really good connection.

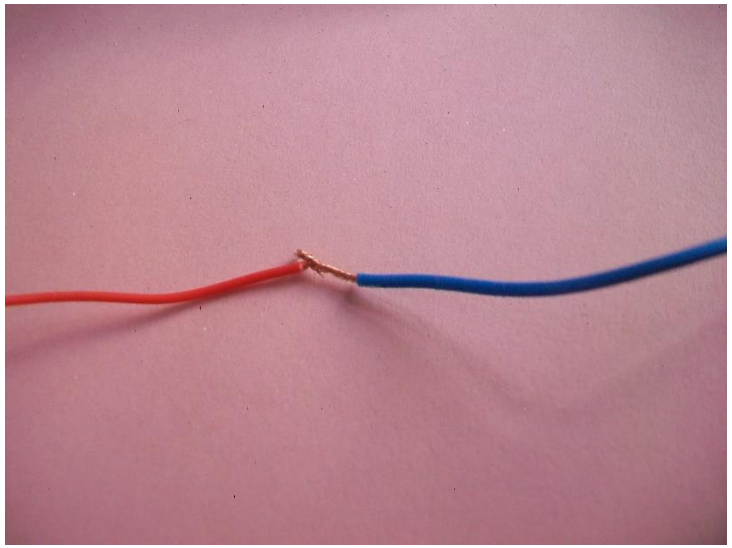


The connection point on this motor has a little hole for threading the wire through. You can then bend the rest of the wire into a neat coil.

A few more wiring tips

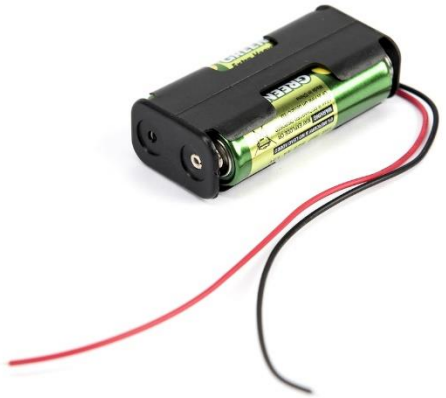
Make sure the 2 connecting wires at a component **do not touch each other.** If they do, the electricity will **short circuit.** This means it will flow straight from one wire to the other instead of through the component.





You may find that you need to join one wire to another. This is easy to do. Just twist the 2 bundles of strands together to make a single thread. Then wrap some plastic tape around the join to hold it securely in place and prevent any short circuits.

Sometimes you may need an extra pair of hands so ask a friend to help and then be ready to help them later!



Don’t be afraid to change your plan if it’s not working. Like all inventors, you will be learning as you go. You may realise there is a much better way to do something than you first planned. This is fine! Just make a note on your planning sheet to explain why you changed your mind.

It’s time to get started!