Science – Year 3/4B Summer 2

Electricity

Electric Personalities

Session 4

Resource Pack

Evaluating my Design

How pleased were you with your finished model? Why?	If you could make it again, what would you do differently? Why?
How well did it work compared to other battery powered electric devices? Why?	
Ask 2 friends to look at your design. In the space below, write what they liked about it and what they thought could be improved.	

Designing my Electric Personality

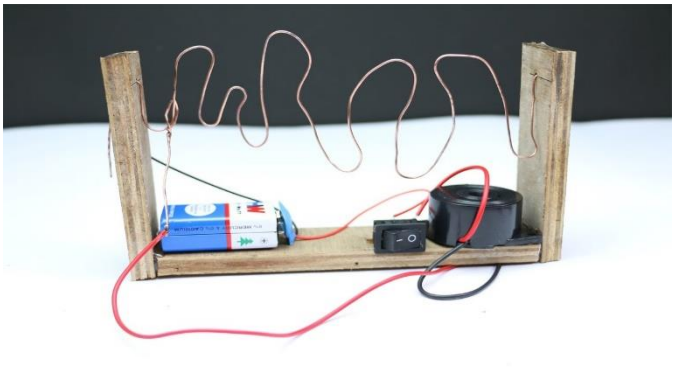
By

My Electric Personality will be a	
It will be called	
It will contain an electric circuit that	
If my design was manufactured it would appeal to	
My design will use these electrical components	
This is my circuit diagram	
These are the other resources I will need to build my Electric Personality	

This is the design for my Electric Personality

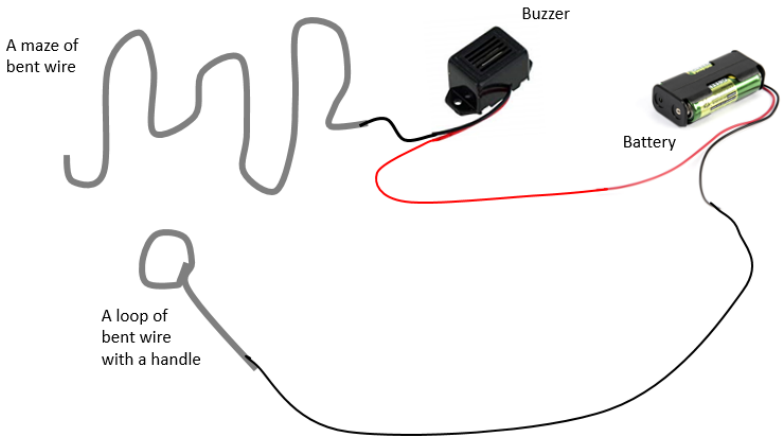
Use the space below to draw your design. Label all items you will use to make it. Add notes to explain what will work. Show what type of switch you will use and where it will go. Try to make your plan as detailed as possible.

Some helpful hints on how make a Buzz Wire Personality



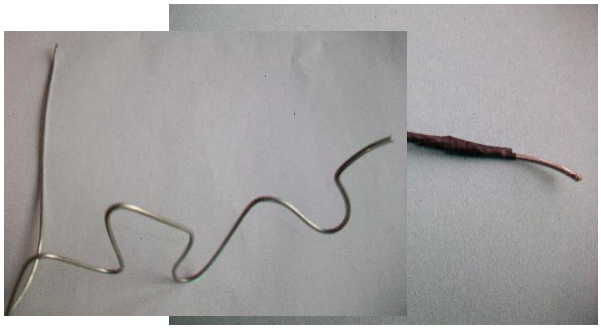
Here is the usual type of buzz wire game where a wire maze is connected to a buzzer and a battery but the circuit is not connected. The wire from the other side of the battery connects to a metal loop.

Here is a simple diagram (without a switch) to show how it works.



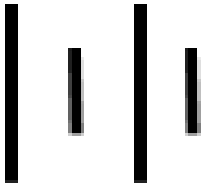
To play the game, a person threads the wire loop along the maze and tries not to touch the maze with the loop. If they do, the circuit is complete and the buzzer sounds.

To make a buzz wire personality, you will need a strong box for the body and 2 cardboard rolls for arms to hold the maze and loop. You can make the head and other parts out of anything you like. You will need to make a wire maze with a long straight end (to go up one of the arms) and a wire loop. You could wind some electrical tape around to make a handle but leave a bit of bare metal at the end. Can you think why? Think what type of switch you will need. Why?



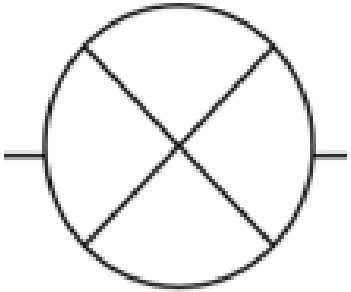
Electrical Symbols

Cell

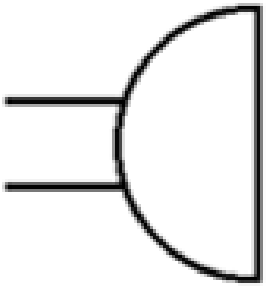


Battery

Motor



Bulb



Buzzer

Switch

Session 4 Teachers' Notes

Resources
Hopefully you will have been collecting various boxes, bottles, tubs and tubes for some time so that you will now have a lot of materials for the children to choose from. Paper plates and cups and disposable wooden or plastic cutlery are great inexpensive additional resources.

Planning Phase
This session is devoted to the important process of planning. By the end of the block each child will have created their own working electrical model - an Electric Personality. During this session they will:

- Decide what sort of personality to make, e.g. robot, animal or person
- Decide what will work using electricity, e.g. press the nose to make it buzz, press a switch for eyes that flash or switch on some revolving antennae
- Collect together any materials needed, e.g. boxes, tubs, tubes etc. and keep them safe in their named carrier bag. They should also make a list of any items still required so they can be sourced ready for next session
- Create their circuit using all the components they will need (and crocodile clips for easy experimentation). They will need to decide whether to include a simple on/off switch for a continuous connection or a pressure switch for short bursts
- Make a diagram of the circuit they will include (with Y4s using recognised electrical symbols)
- Make a labelled annotated diagram of their model showing all the construction materials

A PowerPoint Presentation is provided to help introduce the activity and a task sheet is given to structure their planning.

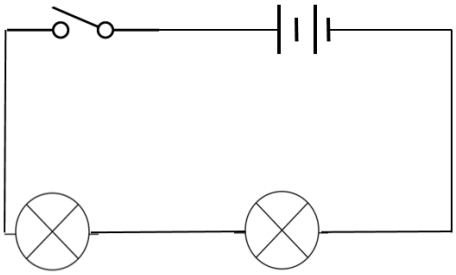
Creativity
Some children will probably know straight away what they want to make whereas others may get their inspiration from handling the recycled packaging - stacking boxes, tubs and bottles etc. to see what they look like. This is all part of the design process.

Experimentation
Although this is the fourth session on electricity and the children will already have a good working knowledge of how to make a simple series circuit, they will need plenty of time to experiment with the components they plan to use and particularly what type of switch to include. Whether your children are making their own switches from split pins or using manufactured alternatives, they will need time to try them out and think about the requirements of their model.
Children using buzzers may need to rediscover that these components only work one way. They should be encouraged to make a note on their diagrams to show which way round to connect the leads. Children using motors may want them to turn in a particular direction so will need to familiarise themselves again with how to connect the terminals.

Some children may want to light two or more bulbs in their project. This will require some logical experimentation on how to achieve this with a single power source and switch. Give them time to

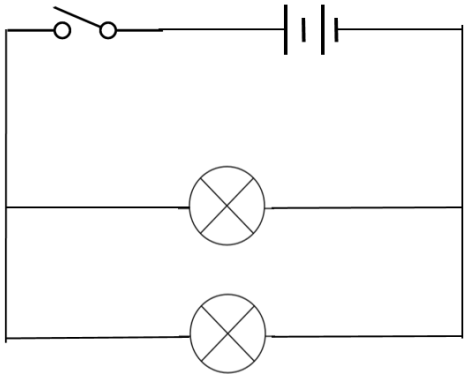
try out some ideas and intervene with suggestions if they are struggling. There are 2 ways they could do it and each has advantages and disadvantages. They are:

1. By putting 2 bulbs into a series circuit



The more bulbs there are in a series circuit, the higher the resistance (resistance is a measure of how hard it is for an electrical current to flow through something). The same is true for other components. When the resistance increases, the current decreases so the bulbs glow less brightly.

2. By adding 2 bulbs in a parallel circuit



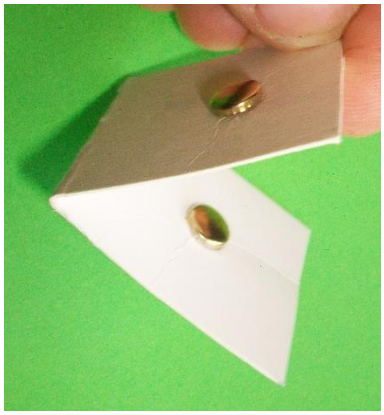
A parallel circuit has one or more extra branches on it. When a bulb is placed on each branch they remain as bright. The electricity can pass through either loop and each loop has only one bulb so the resistance is reduced. The consequence of this is that the cell or battery will not last as long.

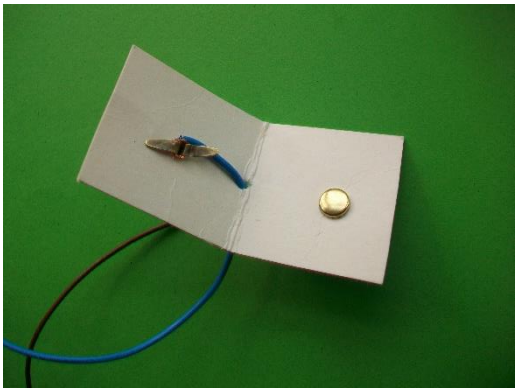
Children do not need to know about resistance at this stage but an able child may enjoy the extra challenge.

Making Pressure Switches

A homemade pressure switch can be made very simply using a small folded rectangle of stiff card with two split pins inserted one above the other so that they touch when the card is closed. The spilt pins can then be joined into the circuit using crocodile clips.

Next session the children will learn how to replace the crocodile clips with neat, secure electrical wires.





Design and Technology Curriculum

As well as science, this project will fulfil a large part of the Key Stage 2 Design and Technology curriculum including sections in Design, Make, Evaluate and Technical Knowledge. This session will fulfil the **Design** objectives.

Organisation

Each child will have a large number of items to keep safe from one session to the next and it can be very frustrating if a crucial component or resource for the project goes missing. Stress the importance of working tidily and putting resources away in their named project bag when they are not being used. Remind children to disconnect all their components at the end of the session when they put them away so that there is no danger that their battery will be losing power because of a rogue short circuit in their bag!