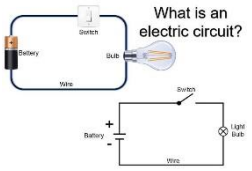
# Design Technology Year 4 Summer Term Circuits with Switches: Torches

Prior Learning: Children will have: *learned how to make shell structures. Learned in science about simple circuits.*

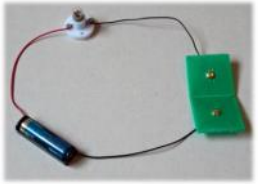
## Creating a battery powered circuit

A circuit is **a complete path around which electricity can flow**. It must include a source of electricity, such as a battery. Materials that allow electric current to pass through them easily, called conductors, can be used to link the positive and negative ends of a battery, creating a circuit.



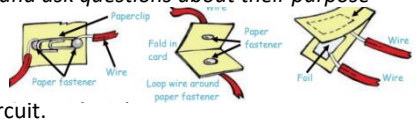

## 1. TWAL: to look at how battery powered circuits work.

*In this first session, the class will discuss, investigate and, where practical, disassemble different examples of relevant battery-powered products. We will answer questions about their function and suitability e.g. Where and why they are used? How does the product work? What are its key features and components? How does the switch work? Is the product manually controlled or controlled by a computer? What materials have been used and why? How is it suited to its intended user and purpose?*



## 2. TWAL: about the different types of switches used in a simple circuit.

*We will begin today by investigating examples of switches, both homemade and those which are commercially available, which work in different ways e.g. push-to-make, push-to-break, toggle switch. We will try using them in our own simple circuits and ask questions about their purpose e.g. How might different types of switches be useful in different types of products?*




sticky knowledge

Switches work by making and breaking the circuit.

## 3. TWAL: About the hazards involved in working with electricity

*Electricity is a type of energy. Like all forms of energy, it can be dangerous if not properly maintained. We will learn this lesson about electrical safety and the dangers of mains electricity. We will learn some simple electrical safety rules, such as not coming into contact with water, and the importance of checking the condition of the batteries prior to use. We will learn about short circuits and how to prevent them.*

sticky knowledge

Short circuits are when a circuit fails as too much power is sent through a low resistence path.

## 4. TWAL: How to problem solve a broken circuit.


*We will review what we have learned so far about circuits and define the parts of our circuit more closely. We will discuss which of the components in the circuit are input devices e.g. switches, and which are output devices e.g. bulbs and buzzers. Designers of electronics need a strong understanding of how to fix problems when they arise. We will show that we can find a fault in a simple circuit and correct it.*

## 5. TWAL: to plan an electrical device that uses a simple circuit and a switch

*Using annotated sketches, cross-sectional and exploded diagrams, as appropriate, we will develop, model and communicate our design ideas. We will consider the main stages in making and testing before assembling our final torch, drawing on the knowledge of how to build torches and shell structures. We will identify the type of switch we intend to use and why it is appropriate for the design*

## 6. TWAL: To create and evaluate a working torch that contains a switch.

*We will use our plans from the previous lesson to create and build our final project. We will start by developing our simple circuit and then move on to a shell structure to contain it. We will ensure we have used appropriate materials to keep our circuits safe, and put in measures to prevent short circuits from occurring. We will then evaluate the torch with the intended user and against design criteria to establish whether it is fit for purpose.*

sticky knowledge

A good designer things about their design criteria at every stage!

## Words we will know!