

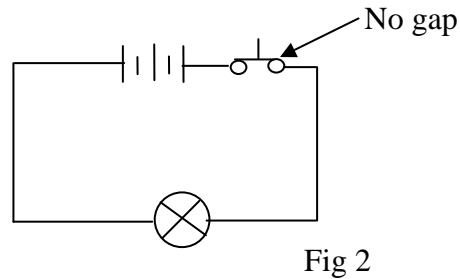
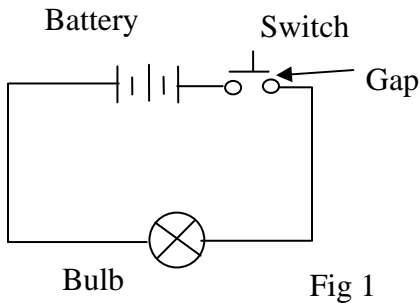
Technological Studies.

In this part of the S1 course, you will be looking at various aspects of electricity and electronics. This is so you can incorporate flashing lights to the clock you will be making in the craft room.

What is electricity?

Electricity is a form of energy. It is generated in a variety of ways – nuclear power, hydro, solar, wave, etc.. Can you think of any other ways of generating electricity?

Electricity needs a circuit to work. If there is a break in the circuit, then the electricity cannot flow. If you look at the 2 circuits below, in fig 1 the bulb will not work as there is a gap in the circuit, but in fig 2 it will work (no gap).



EXERCISE 1.

Question 1. Electricity is a form of energy. Write down 2 other types of energy

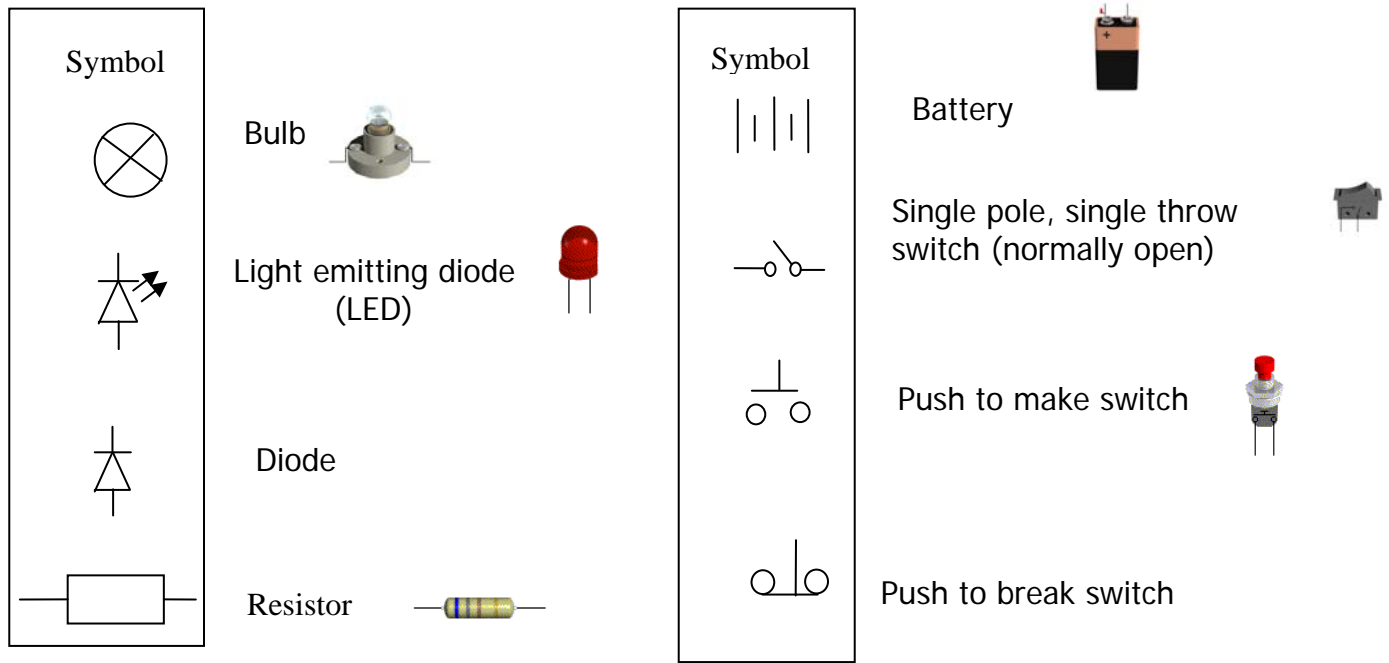
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Question 2. Electricity needs a complete circuit to work. Write down the name of the electrical component that is usually used to open or close this gap in order the turn a device off of on.

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As you will see from the circuit diagrams before, engineers use symbols to identify different components. These symbols are universal, that means that engineers throughout the world can understand them as there is no language barrier.

Listed below are some of the more common symbols that you will come across in the Technology department.



EXERCISE 2.

Question 1. In the boxes, draw the symbols for the following electrical components
Some others terms you will need to know are listed below.

Light emitting diode (LED)

Resistor

Battery

Push to make switch

Power supply. This is where the electricity that is powering your circuit comes from. There are several sources for the electricity we use in the Technology Dept.. These are:

(a) Battery. This contains chemicals that combine to produce electrical energy. Every battery has 2 connections – a positive and a negative. Your teacher will explain this by showing you a battery and identifying the connections.

(b) Bench connections. In room G21, the benches have electrical connections. The red and black connections are 5 volts and 0 volts respectively. Make sure you pay attention so you use the correct connections as you might apply too much voltage and destroy your circuit.

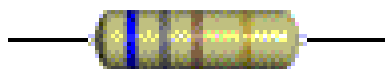
For both batteries and these bench connections, it is important to connect the power correctly. Again, your teacher will explain this.

Load. This is the output of the circuit. In your circuit this will be a light emitting diode (LED). More commonly, it would be a motor to make things move. Can you think of any others possible loads?

Transducer. This is something which uses electricity to do something useful. For example, a kettle. A kettle uses electricity to heat water. The electricity causes the heating element inside the kettle to get hot and this heat is transferred to the water causing it to boil. For homework, you will be asked to think of other transducers in your house.

Voltage. For electricity to flow through a conductor (wire), there needs to be a greater force at one end than at the other end. Think about pushing your pencil along the top of the desk. In order for it to move, the force at one end where you push is greater than the force at the other end, so it moves. The same thing happens with electricity. If the electrical force at one end of a conductor is greater than the electrical force at the other end, the electricity will flow through the conductor. The electrical force is called the VOLTAGE and is measured in Volts (V).

Resistance. Sometimes there is too much electrical power in a circuit and this can cause components to 'burn out' or 'blow'. To reduce the electricity going into a component, we use a resistor. These devices use up some of the electricity so there is less available to overload a component. Resistors come in various values identified by coloured bands on the surface of the resistor (see the picture below). Most engineers will try out a circuit using a computer simulation programme first to check that they have the correct sizes of resistors and other components. Resistance is measured in OHMS (Ω).



Computer simulation. The easiest way to check that a circuit you have designed does the job properly is to try it on a computer package, designed specially for this type of work. The programme is very quick and means you don't have to spend a long time wiring different components together.

Try using Crocclips to complete the circuit shown in Fig 3.

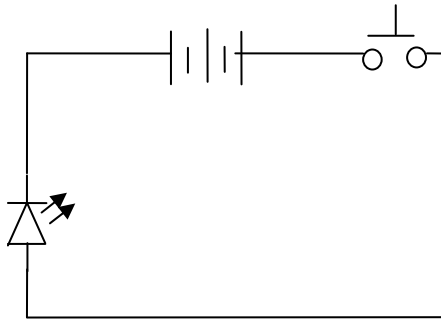


Fig 3

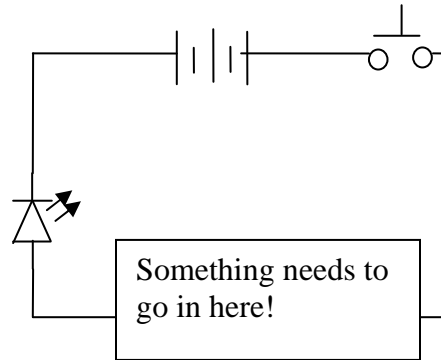


Fig 4

EXERCISE 6.

Write down what happened.

Now complete Fig 4.

Explain what you did to make the LED light up.

EXERCISE 7. Replace the push-to-make switch with a push-to-break switch.

Write down what happened.

EXERCISE 8.

How well did you do the computer simulation?

Very well	<input type="checkbox"/>
Well	<input type="checkbox"/>
Struggled	<input type="checkbox"/>
Could not do it	<input type="checkbox"/>

Soldering. This is a method of joining two or more conductors together. It uses low melting point metal known as SOLDER which can be heated with a SOLDERING IRON. This iron gets very hot and you must take great care with it to avoid burning yourself

EXERCISE 9.

Practical task. Your teacher will demonstrate how to use the soldering iron. You will then build the circuit shown on page 1 of your booklet..

Very well	
Well	
Struggled	
Could not do it	

Technological Studies

Week 9 Basic Electronic Theory, what is electricity? power supply-circuit-load, , what is a transducer? Examples of [homework]

Week 10 Crocodile Clips intro.... resistance and voltage, build this circuit...why doesn't it work?....questions on numerous circuits to cover diodes, resistance and diodes and BS symbols

Week 11 Soldering! Manufacture a simple circuit. Battery holder, switch, resistance and light emitting diode.