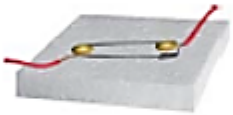
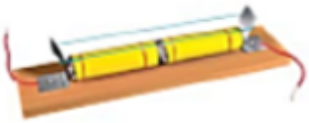
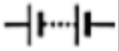
Board – CBSE	Class – 7	Topic – Electric current and its Effect

- **Electric Components and their Symbols**

S.No.	Electric component	Symbol
1.	Electric cell 	
2.	Electric bulb 	
3.	Switch in 'ON' position 	
4.	Switch in 'OFF' position 	
5.	Battery 	
6.	Wire 	

Symbols of different Electric Components

An **electric component** is an element of an electric circuit that helps in its functioning. The **electric circuit** allows electricity to flow through it and provides electricity for various purposes such as running electric motors, providing electricity to a bulb or a fan, generating heat.

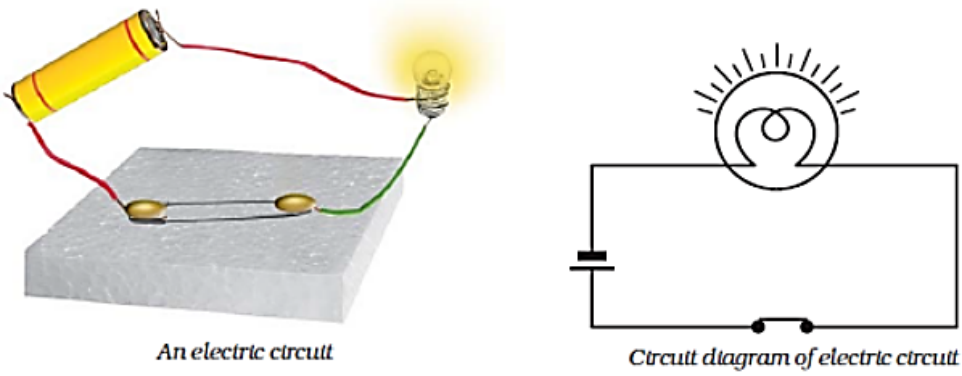
A **battery** is defined as a combination of two or more cells. In a battery, the negative terminal of one cell is connected to the positive terminal of the next cell and so on. Batteries are used in several devices such as toys, remote control, torches and transistors.

(a) A battery of two cells
(b) A battery of four cells

Connecting two cells together to make a battery

Batteries

- **Drawing an Electric Circuit Diagram**



An electric circuit and its circuit diagram

yAn **electric circuit** can be drawn on paper with the help of the symbols used to represent the electronic components. Such a representation of an electric circuit using its symbols is called an **Electric Circuit Diagram**.

The electric circuit diagram consists of a **key** that acts as a **switch** for the circuit. The key can be placed anywhere in the circuit.

Open Circuit –

When the key is switched off or opened, it is an open circuit as it is incomplete.

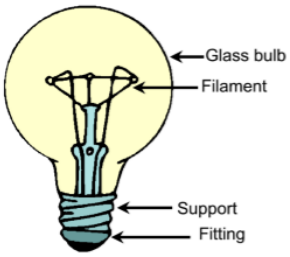
Closed Circuit –

When the key is switched on or closed, the circuit is said to be a closed circuit as it is complete.

The electric circuit shown here consists of a bulb. The bulb has a wire present inside it called the **Filament.** When the electric current passes through the filament, it is closed. The filament breaks when the bulb gets fused.

- **What happens when the filament of a bulb breaks?**

When the filament of a bulb breaks, the circuit of the bulb becomes incomplete. Hence the bulb does not glow as it does not receive any electricity.



A light bulb

- **The Heating Effect of Electric Current**

  When an electric current passes through a wire, the wire gets heated up. This is known as the **heating effect of electric current.**

  The heat that is produced in the wire depends upon the following factors:

  - The material of the wire
  - The length of the wire
  - The thickness of the wire

  Many appliances work on the heating effect of electric current such as:

  Electric heater, electric iron, electric stove, geysers, electric coffee maker, toaster, hairdryer.

Appliances that work on the heating effect of electric current

All these elements produce a high amount of heat when electricity passes through them. However, this amount can change depending upon the requirements of the device. This is so because they contain a coil of wire known as an **element**.

Depending upon the amount of heat required by such appliances, different types, sizes and lengths of wire are used in them. Some wires can break down or melt as they get heated.

- **Production of Light in a Bulb due to the Heating Effect of Electric Current**

  The filament of a bulb is a coiled wire that gets hot when electricity is passed through it. This makes the filament glow, and as a result, light is produced from the bulb.

Glowing filament of Electric Bulb

- **What is an electric fuse?**

An electric fuse is a device used to prevent damage caused by an excess of electric current. According to the heating effect of the electric current, a wire becomes hot as current is passed through it. However, if an excess of current is passed through a wire, it can melt or break.

Fuse used in buildings

Fuses used in electrical appliances

Different types of Fuses

The electric fuse consists of a wire which is made up of a metal or an alloy that has a low melting point. As a result, the wire breaks down easily as a high current passes through it. As the wire breaks, the fuse circuit opens and hence no further current passes through it.

This can prevent a short circuit for fire due to a high electric current.

Different types of fuses are used for different devices, and some are also available for houses.

- **How can excessive current pass through a circuit?**

Reasons why excessive current can pass through a circuit:

Sometimes we connect different devices to the same socket, which draws more current from that socket. As a result, the load on the circuit increases, leading to a short circuit or fire.

When the insulation of wires gets torn away, the wires can come in contact with each other, which cause a spark or may lead to a fire (short circuit).

This is why fuses are used to prevent any short circuits and overloading.

- **CFL (Compact Fluorescent Lamp)**

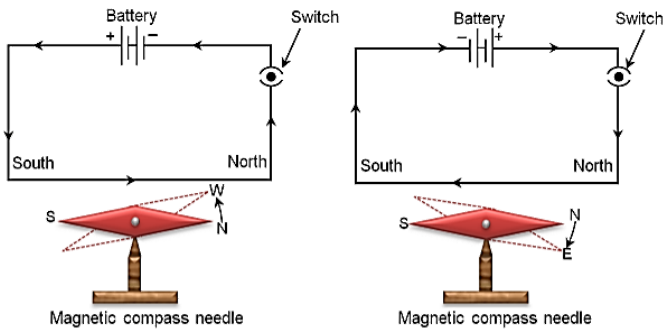
- CFLs do not work on the heating effect of electric current.
- They do not have a filament inside them. Instead, CFLs contain two electrodes that produce light.
- These bulbs have a fluorescent coating inside them which makes the light brighter.
- CFLs thus save energy as they do not produce heat along with light.
- Ordinary bulbs, on the other hand, waste energy as they get heated while lighting up.

- **What are miniature circuit breakers (MCB)?**
  - A **miniature circuit breaker** or **MCB** is generally used instead of fuses. A fuse breaks due to excessive current so that the circuit opens up and the damage can be prevented. However, once a fuse breaks down, it cannot be used again.
  - MCB, on the other hand, is a switch that turns OFF on its own when a circuit overloads. Once the problem in the circuit is rectified, we can switch ON the MCB once again.

Miniature Circuit Breaker (MCB)

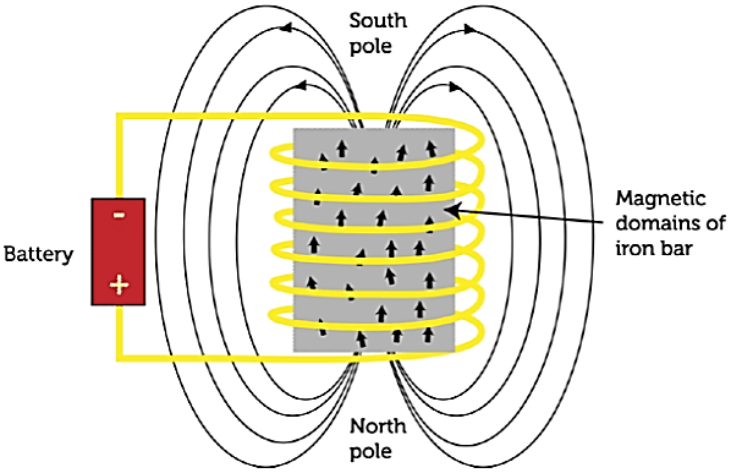
- **Magnetic Effect of Electric Current**

  When an electric current is passed through a wire, it behaves like a magnet. This is called the magnetic effect of the electric current discovered by a scientist, Hans Christian Oersted.
  He discovered that the needle of a compass deflects when an electric current is passed through a wire placed near the compass. This indicates that a magnetic field is created near the wire that deflects the needle.



Deflection in Compass Needle due to Electric Current

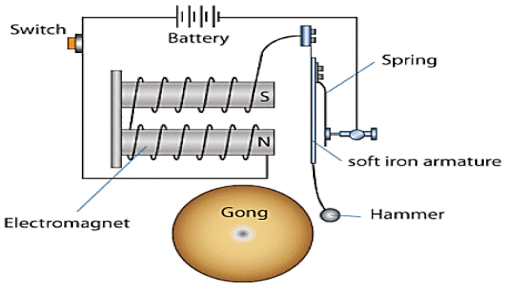
- **Electromagnet**
  - ❖ Every magnetic material has a magnetic field up to which the influence of its magnetism can be experienced.
  - ❖ A magnet whose magnetic field is generated with the help of an electric current is called an **Electromagnet**.
  - ❖ The Electromagnet is formed because of the magnetic effect of the electric current.



Electromagnet

- **Applications of Electromagnets**
  - ❖ Electromagnets are used in domestic appliances such as electric bells.
  - ❖ They are used in toys.
  - ❖ They are used in all kinds of telecommunication equipment.
  - ❖ They are used in cranes to separate magnetic materials from junk and to lift heavy objects.
  - ❖ Doctors use them to remove any magnetic materials that we have fallen in the eye.

- **Electric Bell**



Electric Bell

  - ❖ **Components of an Electric Bell**

- A coil of wire wound over an iron piece that forms the Electromagnet.
- An iron strip (soft iron armature) has a hammer attached to it joined to the wire coil.
- A contact screw through which is attached to the iron strip.
- A battery that connects the wire coil and the contact screw.
- A switch in the middle of the circuit.

❖ **Working of an Electric Bell**

- When the switch of the Bell is ON, an electric current flows through the coil of wire, making the iron piece attached to it act as an Electromagnet.
- As a result, the iron piece attracts the hammer towards itself. The hammer thus hits the bell, and a sound is produced.
- As the hammer moves towards the iron piece, it moves away from the contact screw, breaking down the circuit.
- As the circuit breaks, the wire coil stops receiving any current, making the Electromagnet lose its magnetic effect.
- As a result, the hammer falls back to its original position.
- Then, as the hammer falls back, the iron strip comes in contact with the contact screw, and the circuit is completed.
- This again turns the iron piece into an electromagnet, and the whole process continues until the bell is switched OFF. This results in the continuous ringing of the bell.