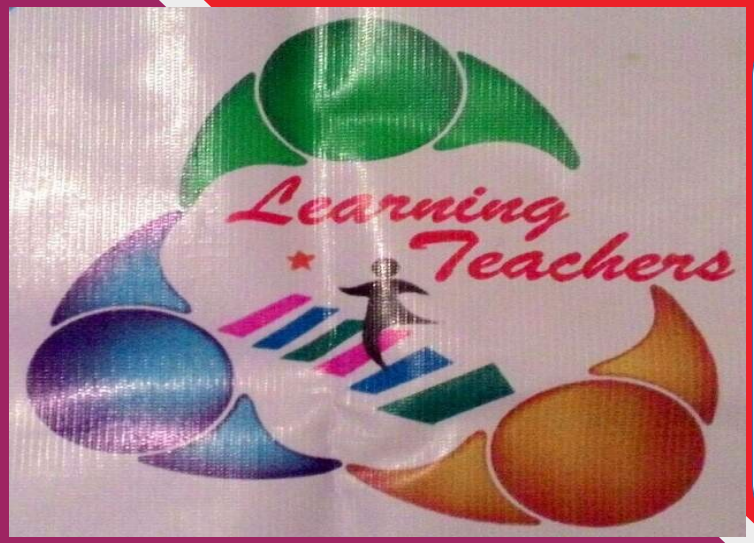
3 The World of Electricity



T SREELAL

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Learning teachers Kerala

The World of Electricity

Recall !

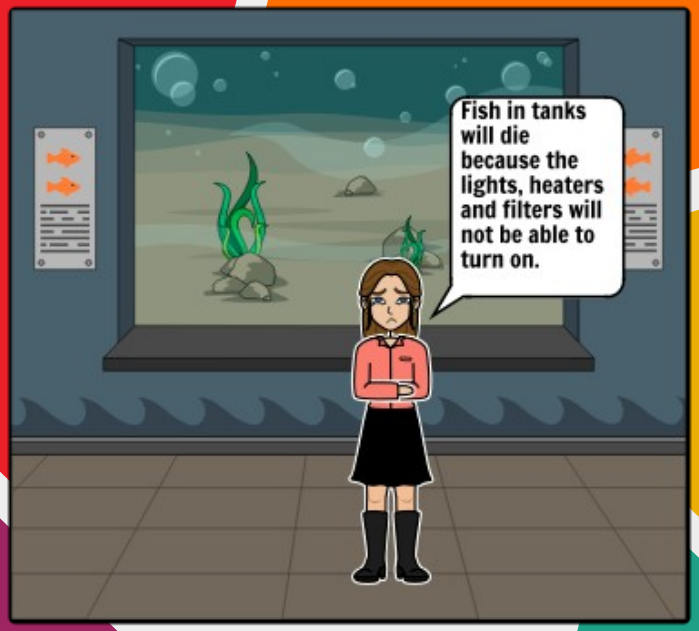
Which is the form of energy that used to illuminate the bulb?
Which all are the forms of energy that being produced?
Which among them we make use of?

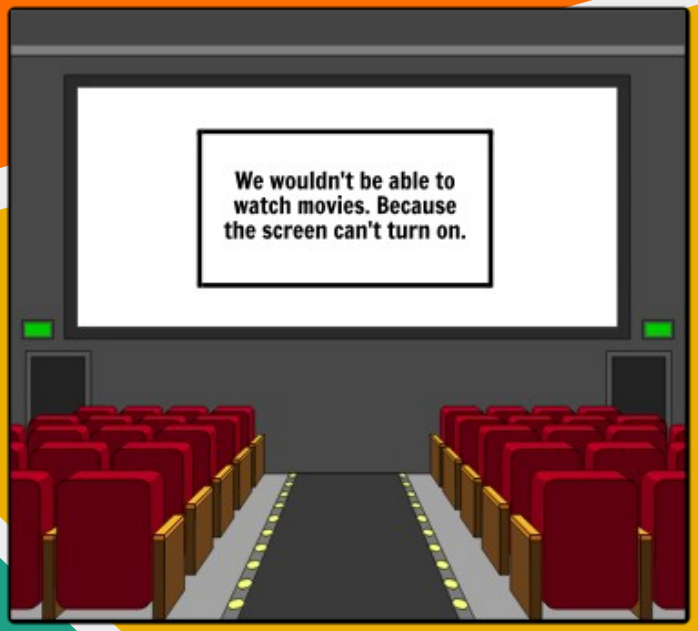
With out electricity

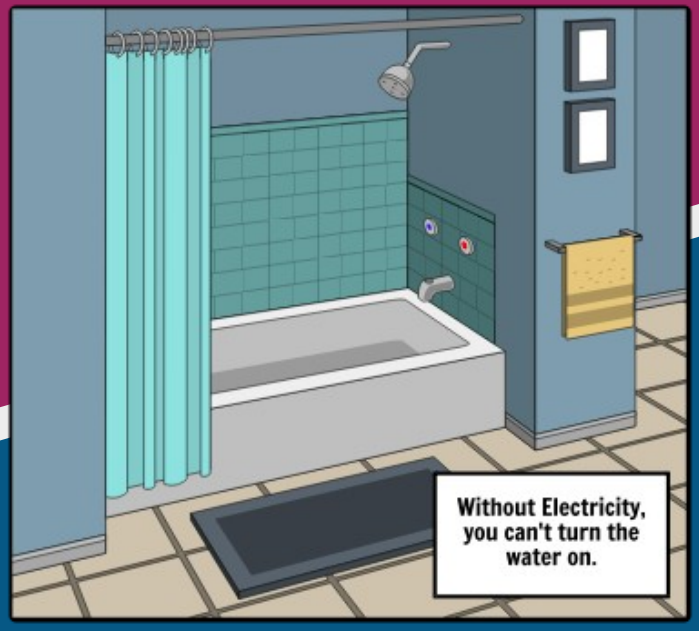
What do we usually do to get light when there is a power failure?

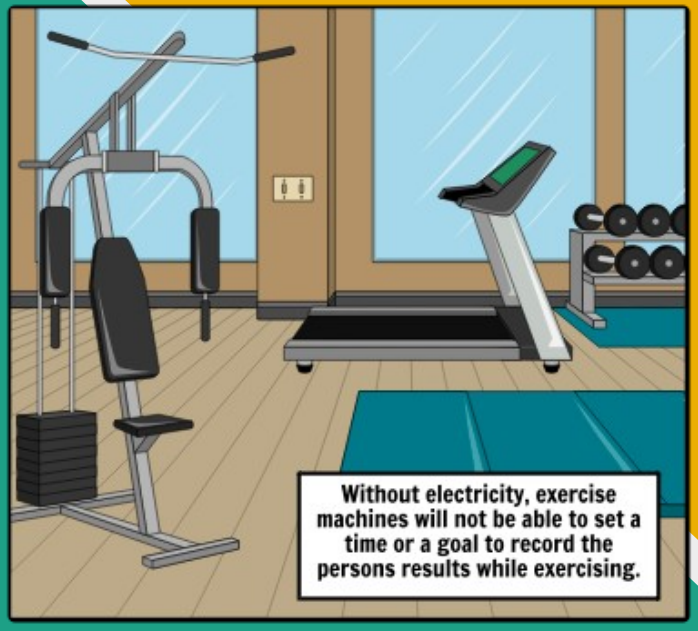
What are the problems that you face at home on day when there is no power supply?

With out electricity

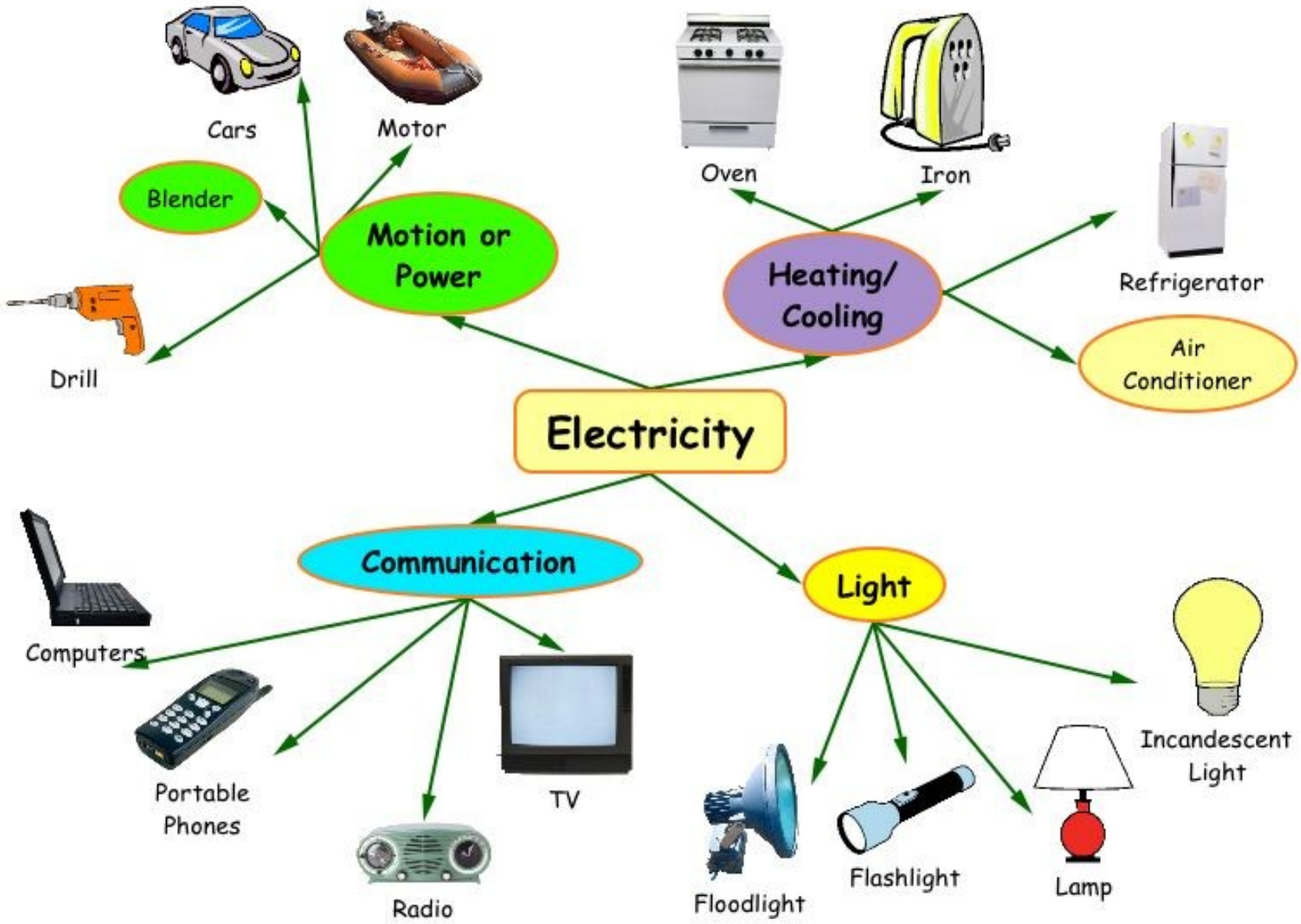








Uses Of Electricity In Our Daily Life



What are the things needed to make an emergency lamp?

- How will we get the electricity to make the emergencylampwork?
- Don’t we need a bulb to get light?
- How will we connect each part?
- How will we make a stand?

Availability of Electricity

Where does each of these devices get its electricity from?

sourcesof electricity

Electric cells, generators, solar cells etc. are the devices thatprovide electricity. Devices that provide electricity are termed as Sources of electricity.

Electric cells

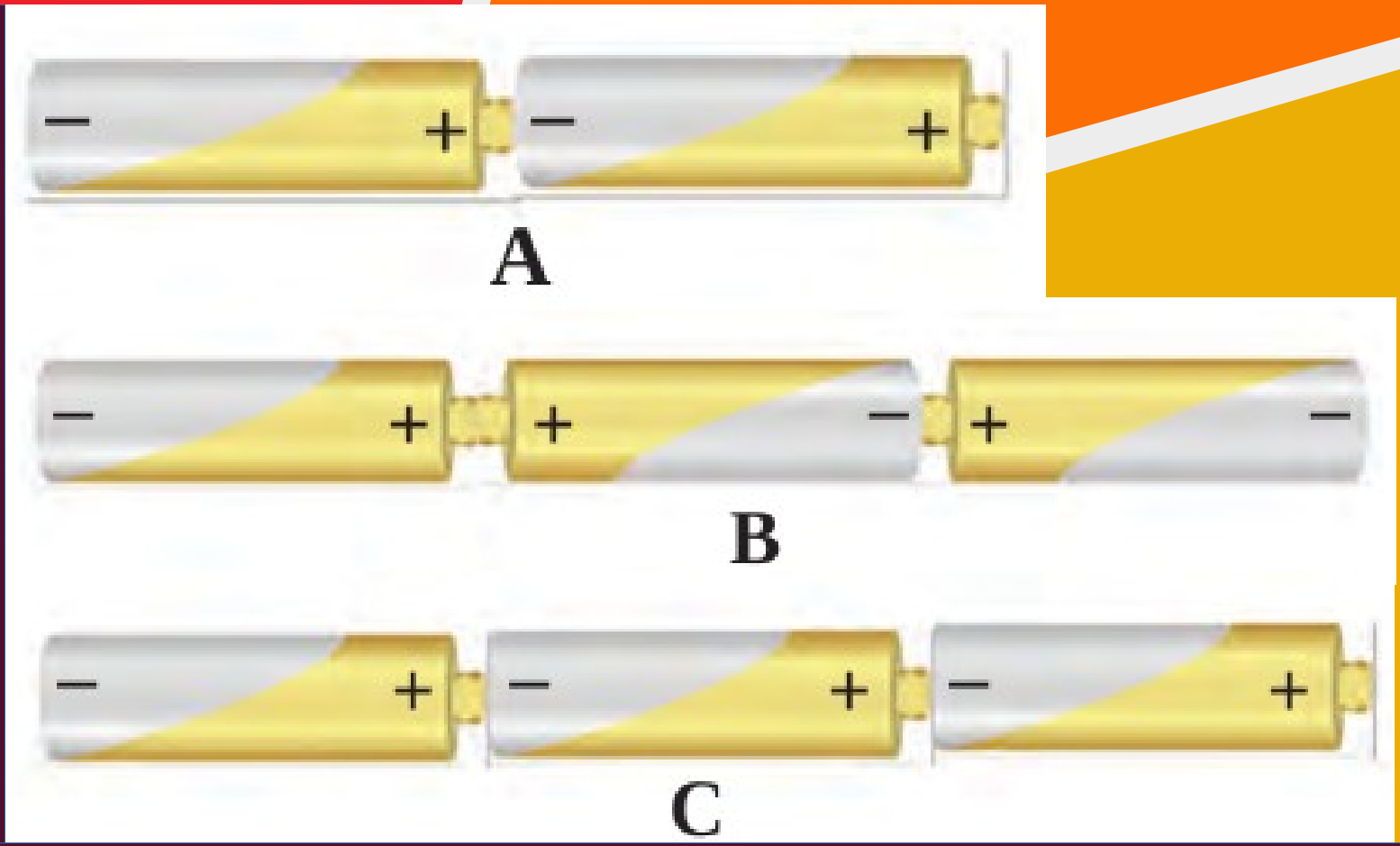
Electrical energy is stored as chemical energy in electric cells. This chemical energy is converted into electrical energy when we use them.

Cell and Battery

A battery is an arrangement made by connecting more than one cell into a single unit.

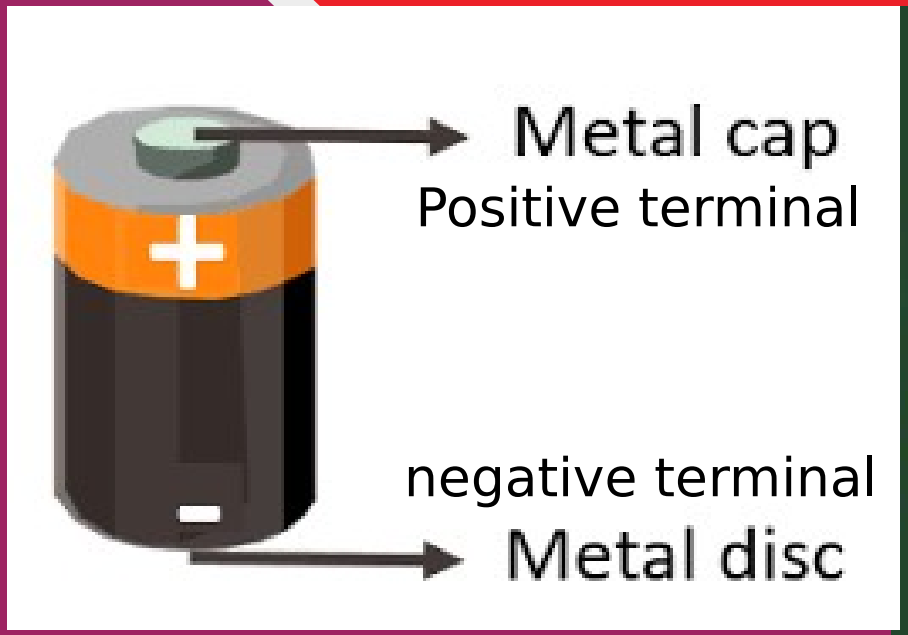
Arrangement of cells

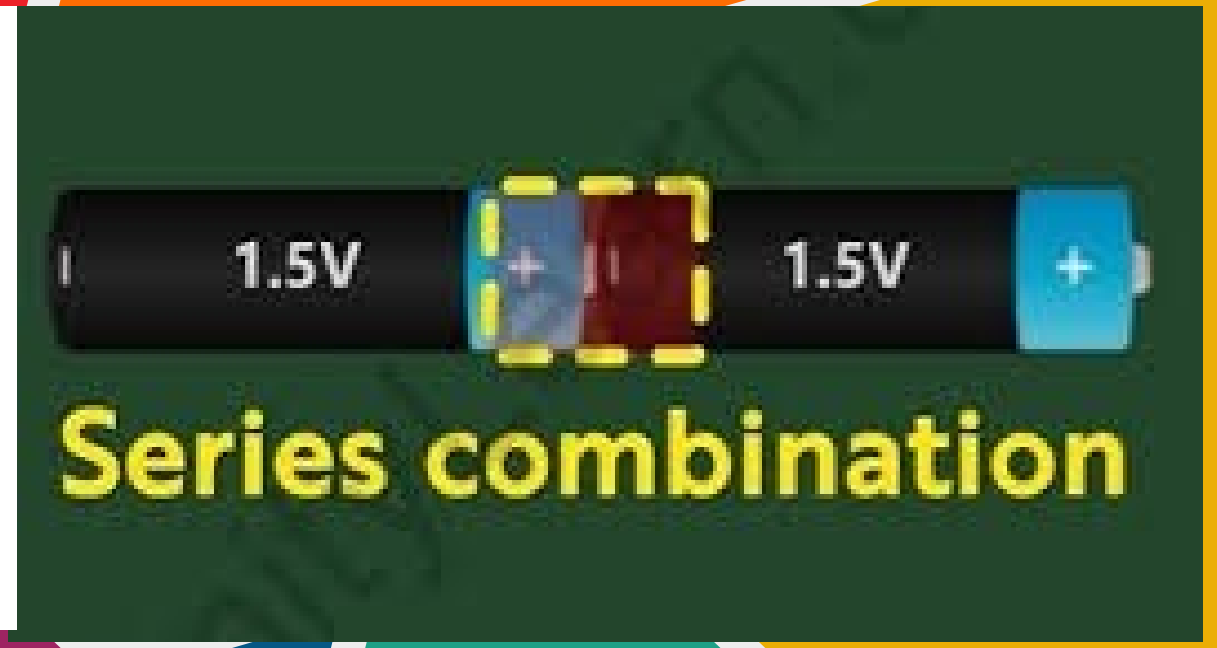
cells are connected here in three different ways.



Do all of them represent the right way for making a battery?
Which among them is wrong?
Which one will give more electricity?

Arrangement of cells





Positive and negative terminals should be connected and more cells should be used to get more electricity

Cells – Rechargeable and Non-rechargeable

What would you do if the cell in a clock is not working?
What if your mobile phone runs out of charge?

A Brief History of Electricity

Electricity, light, heat, sound etc., are different forms of energy. Electricity is a form of energy widely used for various purposes. The ancient Greeks understood that amber (a kind of thickened resin) could attract substances like hair when it was rubbed against wool. Subsequently numerous experiments conducted by a number of people over the years led to theproduction and use of electricity as seen today.

Electric bulbs

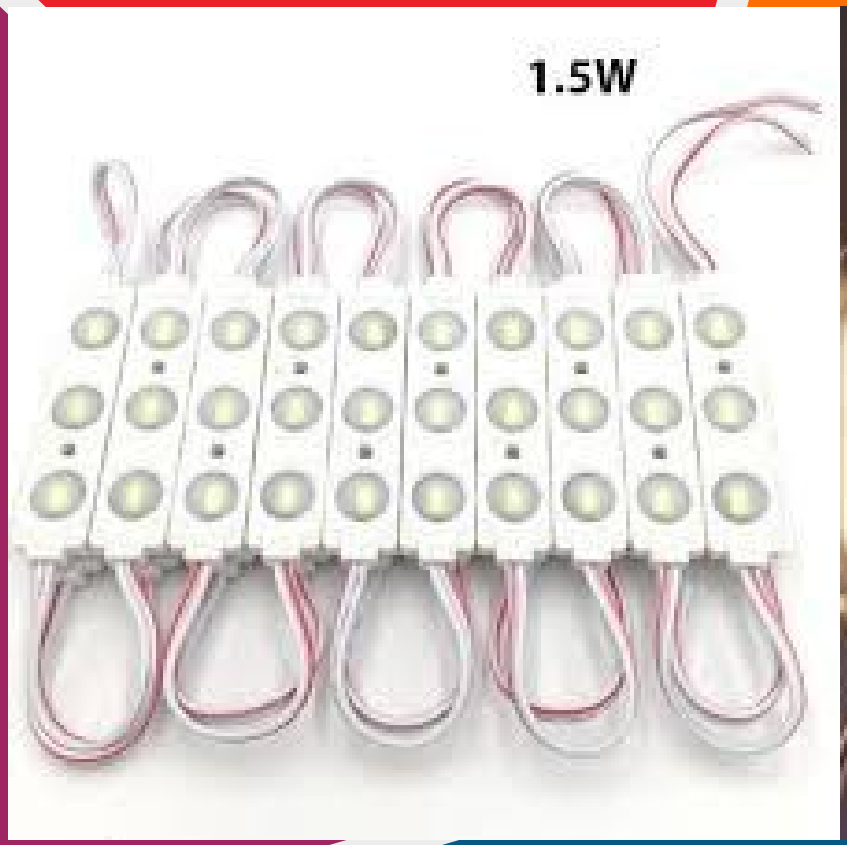
Filament lamps recquires more energy.

CFL requires less energy compared to filament lamps.

LED bulbs require less energy than CFL.

L E D (Light Emitting Diode) helps to save energy considerably.

LED module

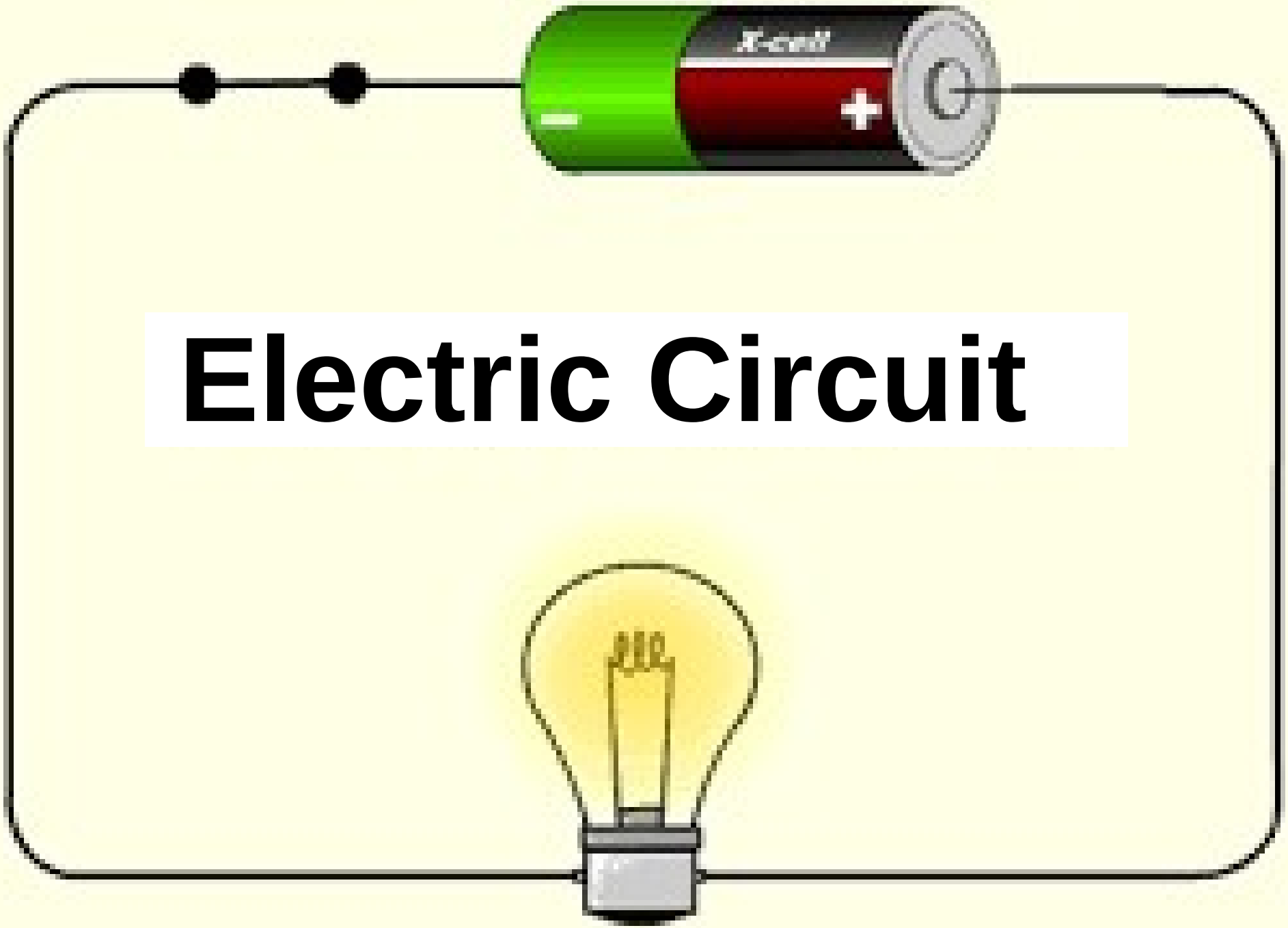


LED module is an arrangement of more than one LED bulb in a strip

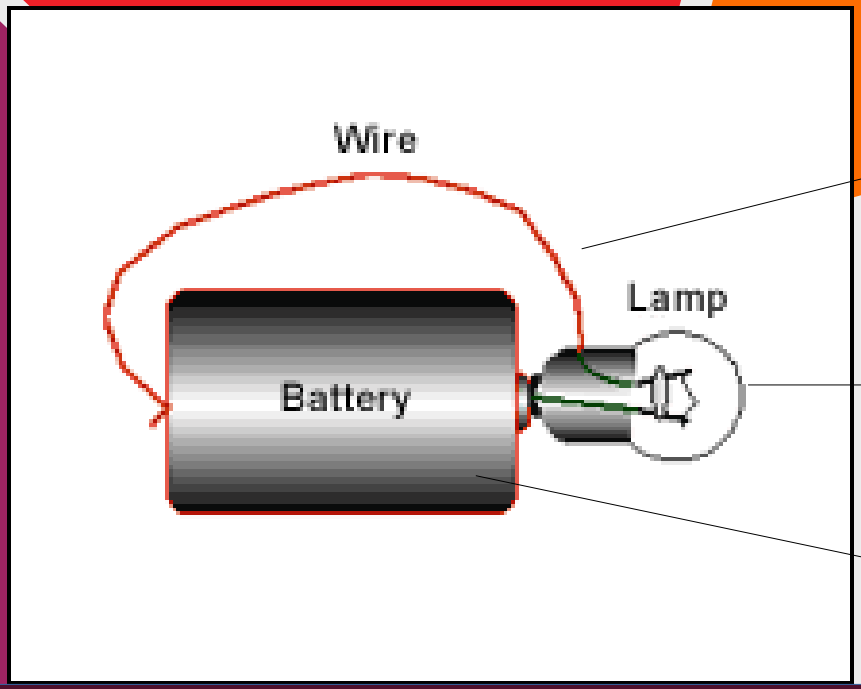
Let’s connect an LED module

Try to light up the LED module by using 9V battery, connecting wires, and a connector

Electric Circuit



Basic parts of an electric circuit



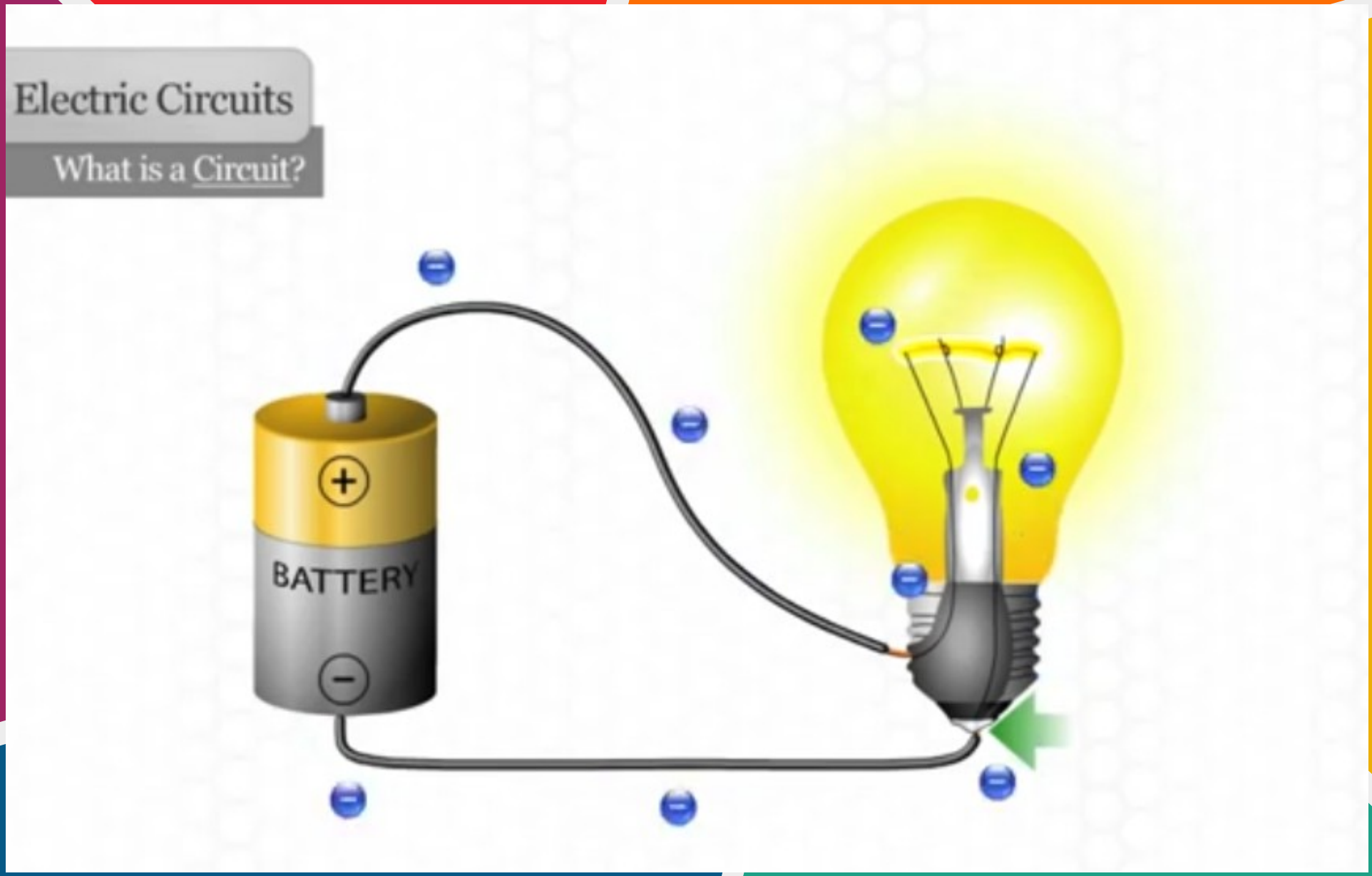
Connecting wire

Electrical device

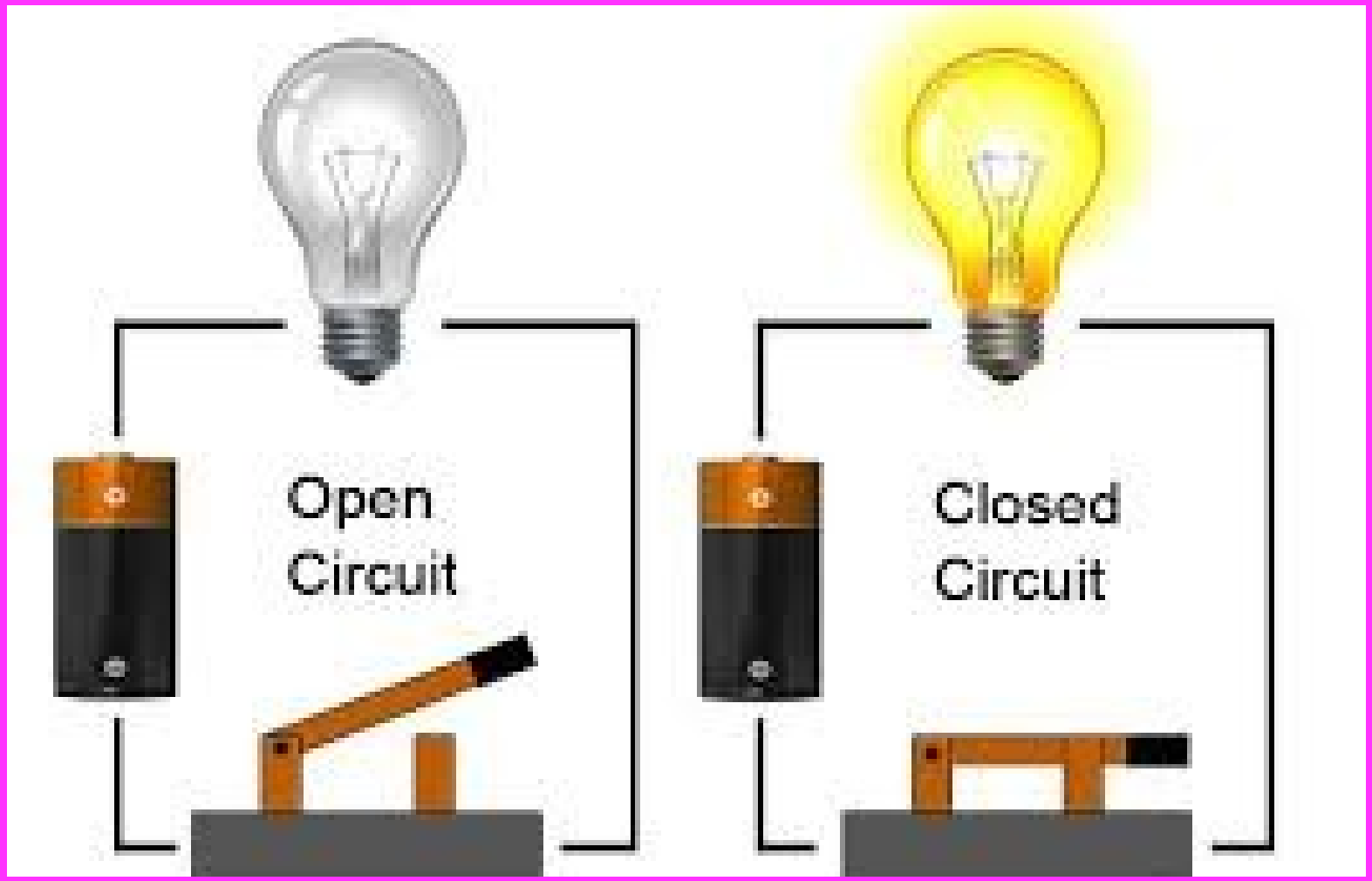
Source of electricity

Electric circuit is an arrangement that passes electricity from an electric source to a device. A circuit requires at least an electric source, Connecting wire and an electric device.

Watch the video



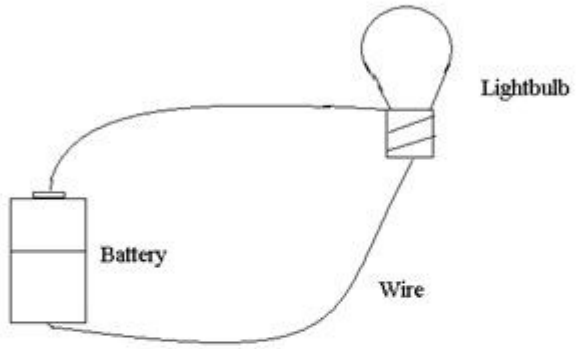
Open circuit and Closed circuit



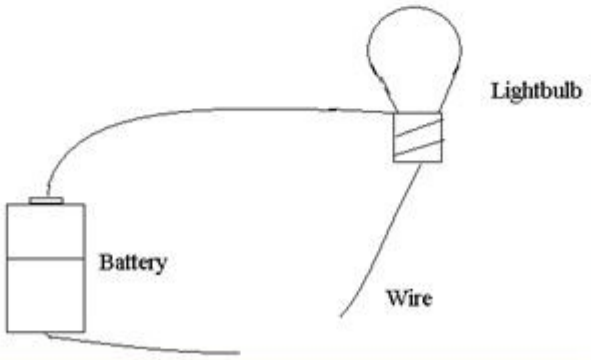
Electric Circuits

- All electric circuits come in two basic flavors.
- They are either open or closed.
- Closed circuits are completely connected, and the electricity can flow.
- Open circuits have a spot or spots where they are not connected and will not allow electricity to flow.

Closed Circuit

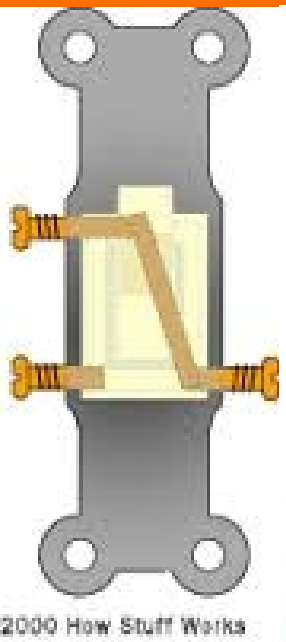


Open Circuit



switches

Normal Switch



Three-way Switch

Switch is a device used to make a circuit closed or open when required. A circuit becomes closed when switch is turned on. It becomes open when switch is turned off.

Different types of switches

Ordinary Switch

Two - Way Switch

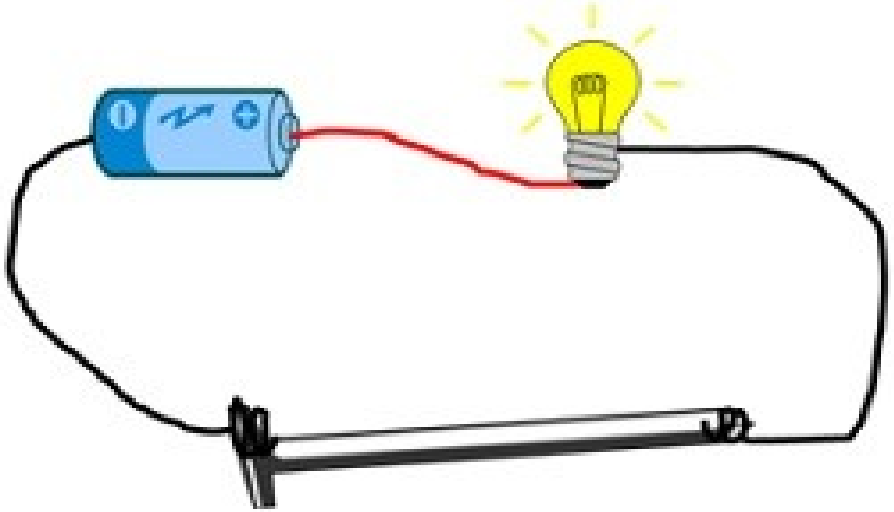
Bell Switch

Push Button Switch

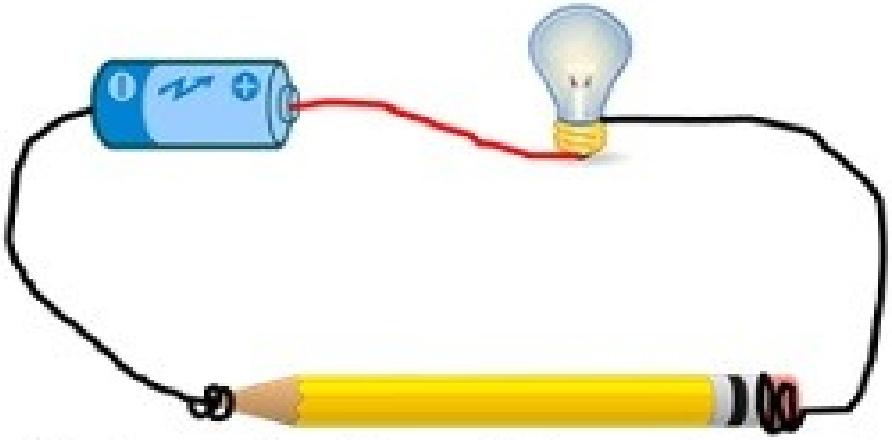
Sliding Switch

Main Switch

Substances that conduct or resist electricity

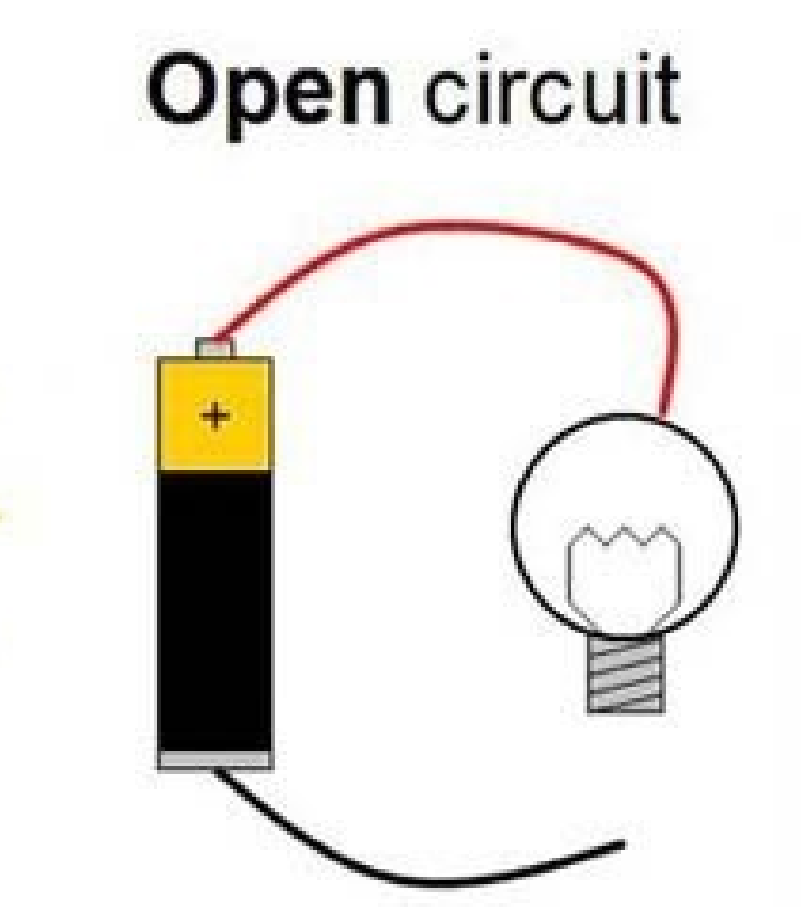


Iron nail acts as a conductor as it allows electricity to pass through



Wooden pencil acts as an insulator as it does not allow electricity to pass through

Which all materials can be used to complete the circuit?



Safety pin,
a piece of wood,
paper,
steel scale,
charcoal,
pencil graphite,
plastic bangle,
metal bangle,
wet paper,
copper wire.

Let's do the experiment and
tabulate your observation

Material used	Observation	Inference
Paper	The bulb did not glow	does not conduct electricity
….	…..	
….	….	
…..	…..	

Conductors are the substances that allow electricity to pass through them.Insulators are the substances that do not allow electricity to pass through.Iron, gold, copper, steel, graphite and water are electric conductors. Drywooden block, paper, plastic, cloth etc., are insulators.

Situations in which Conductors and insulators are used

Situations in which conductors are used	Situations in which insulators are used
The copper wire through which electricity passes through	Plastic coating over copper wire
Aluminium wires are used to carry electricity	Insulation tape is used when connecting wires
The part through which electricity passes in devices is made of metals	The part we touch on the switch is made of plastic
Fuse wires are made of conductors	The parts we touch on electrical devices is made of insulators

Let's repeat the experiment that we have done to distinguish conductors and insulators by using the following materials

Materials: iron nail, copper wire, silver ornament, gold ornament, aluminium wire, a piece of zinc, lead wire, magnesium ribbon, a piece of tin sheet.

Do these substances have any common Characteristics?

All metals are conductors of electricity

Metals

Metals are lustrous, hard and strong substances. Many metals like iron,copper, silver, gold, aluminium, zinc, lead, mercury, nickel, etc., have been discovered. Usually metals are in solid state under normal atmospheric temperature. But mercury exists in liquid state. All metals are conductors of electricity. The discovery and use of metals have brought remarkable changes in human life. You might have understood the changes that occurred in agriculture tools and social life from the Paleolithic to the Bronze Age.

Let’s try to make different circuits using the materials shown inthe picture

Arrange circuits in any boards like hard board, card board or cork sheet.

What tools did you use to make the circuits?

Cutting pliers

Stripper

Screw driver

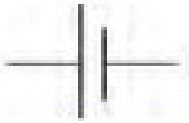
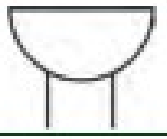
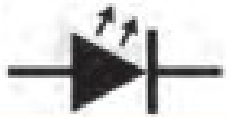
Tester

.....

Symbols

Certain signs are used to indicate the components in circuits.

These are symbols

Material /object	Figure	Symbol
Conducting wire		
Switch off mode		
Switch on mode		
Cell		
Battery		
An unlit bulb		
A glowing bulb		
Buzzer		
Mini motor		
LED		

Let’s construct the emergency lamp

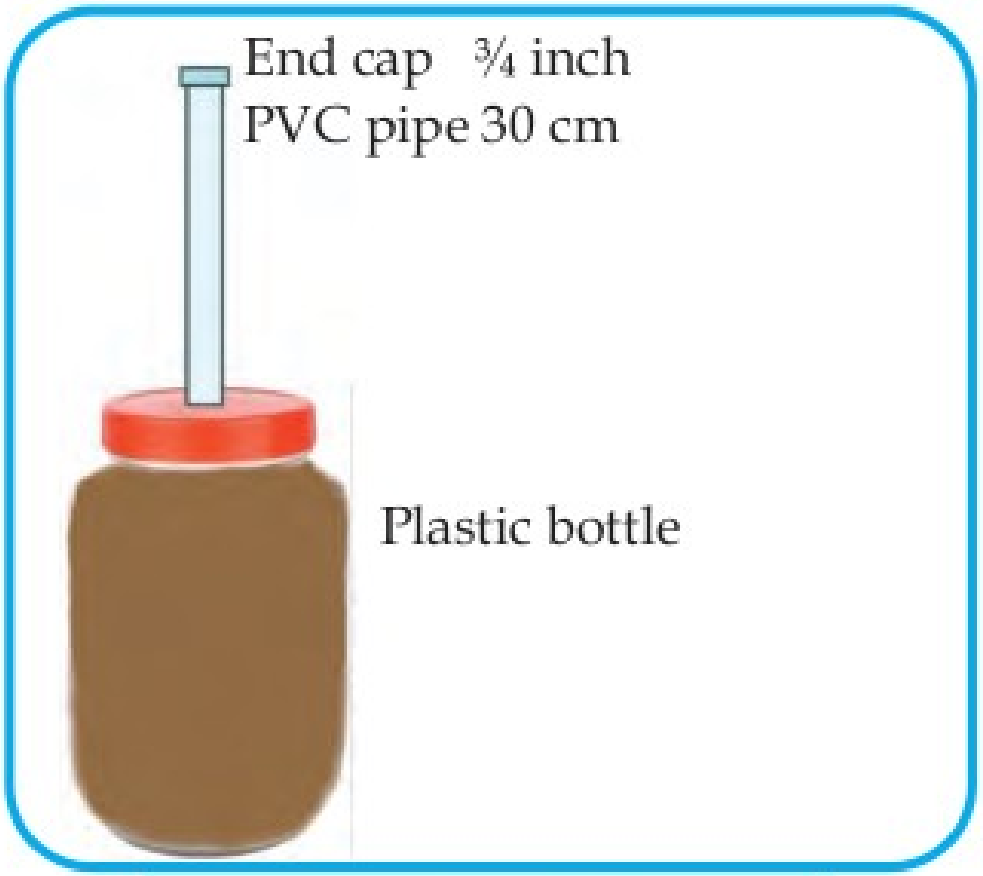


Figure - 1

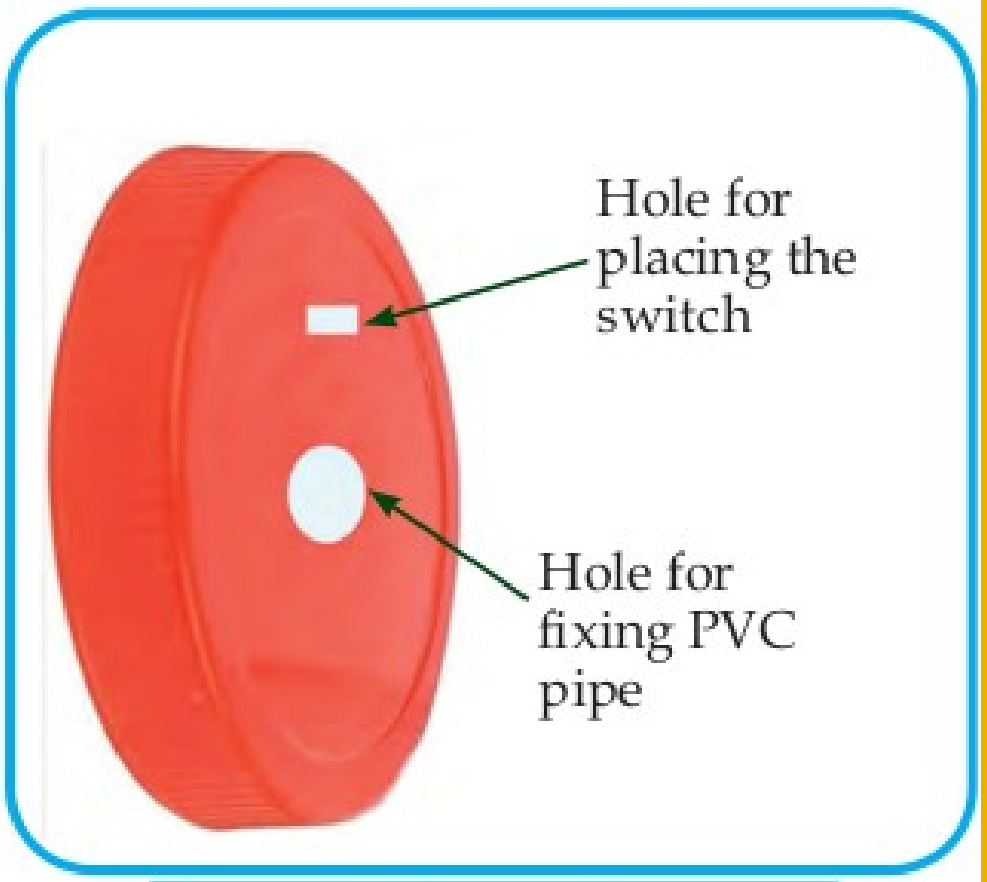


Figure - 2

Let’s construct the emergency lamp

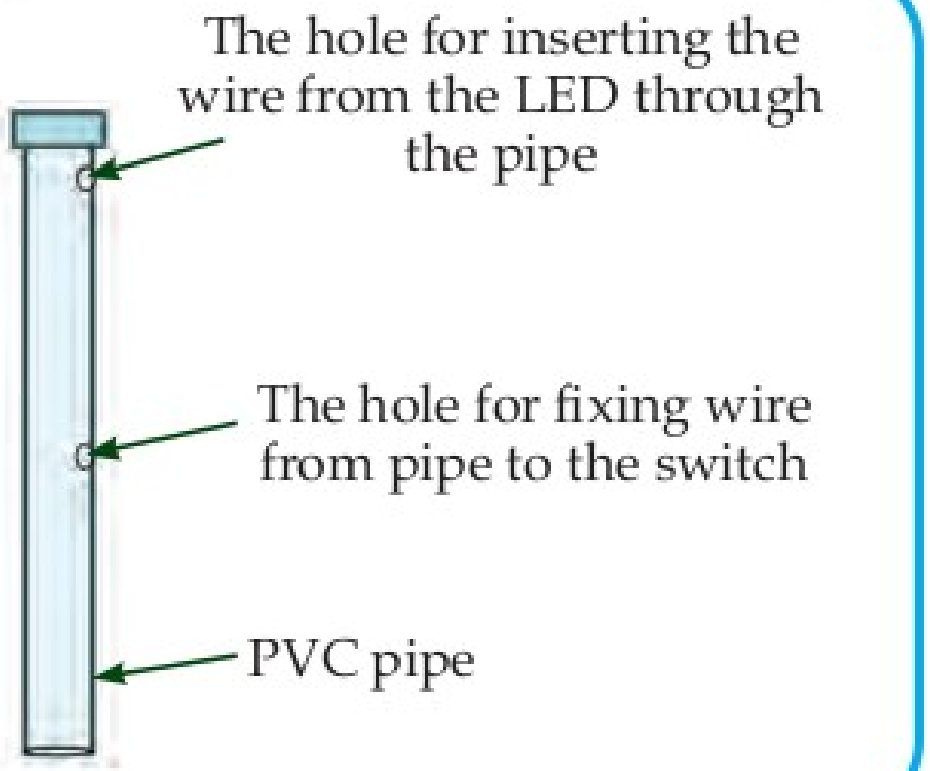


Figure - 3

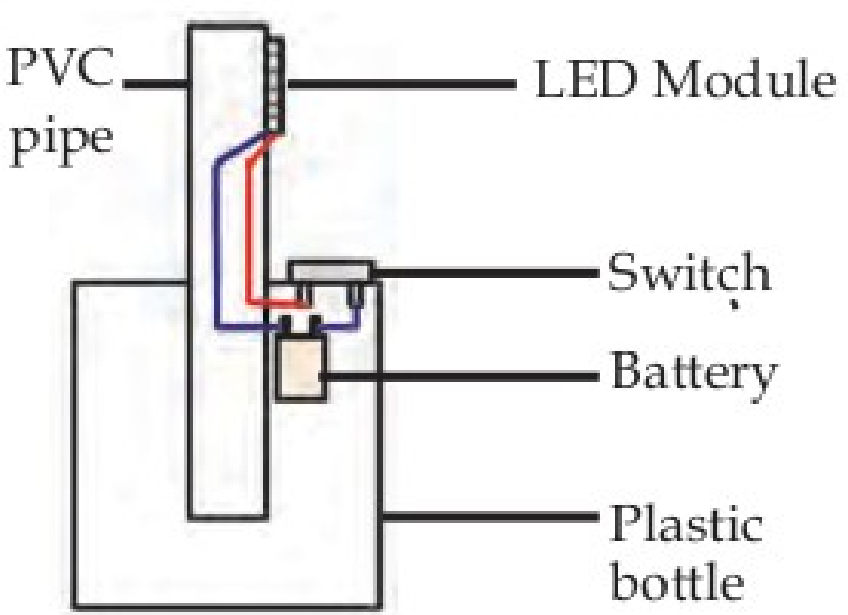


Figure - 4

Let’s construct the emergency lamp

The circuit should be made in such a way that the wirefrom LED to the switch and from the switch to the battery are not exposed.

• Battery should be fixed firmly in the sand.

• The emergency lamp should be lifted only by holding thebottle.

Household electricity

We have used a 9 V battery to make an emergency lamp.The electricity we used at home
is of 230 V. It is not safe to use high voltage electricity while conducting experiments.

We get an electric shock when electric current passes through our body.Our body is an electric conductor since water is present in the living cells.
Electric shock occurs when a broken power line or an external electric source, like an uninsulated circuit comes into contact with the body.Sometimes this causes severe burns. Cardiac arrest is the major reasonfor death due to electric shock.

How to save a person who gets an electric shock ?

• The first thing to be done is to disconnect the electric contact. You can switch off or remove the fuse forthis. If it is not possible, separate the person from the electric circuit using a dry wooden stick or some other good insulator.

• In the case of heart failure, perform chest compressions. Place one hand on top of the other and apply continuous pressure on the victim's chest.This should be done until the heart starts beating again.

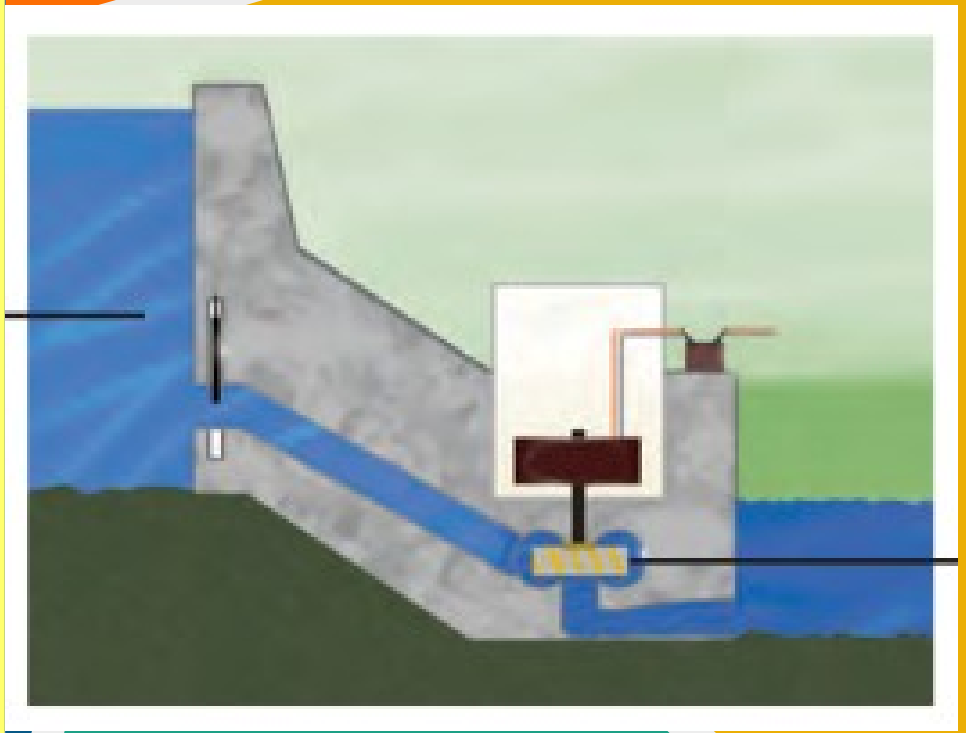
• If breathing stops, give artificial respiration. Keep the body warm by Massaging.

• Take the person immediately to a hospital if the shock is severe.

Hydroelectric Power Station

Hydroelectric Power Station

Water which is stored in reservoirs is carried through pipes and made to fall forcefully on to the turbines connected to the generators. The force of falling water rotates the turbines. The generators connected to the turbines start to work and produce electricity.
This electricity is transmitted to various places through electric lines.



Other Possibilities for Electric Power Generation

Thermal power station

Nuclear power station

Windmill

Other Possibilities for Electric Power Generation

Solar cell is a device that converts solar energy into electrical energy. Solar panel is a combination of two or more solar cells. Solar energy is a solution for the future energy crisis

How to avoid wastage of electricity ?

1. *Operate the electrical equipments only when they are needed,*
2. *Make sure they are turned off when not in use,*
3. *Install systems to avoid leakage of electricity,*
4. *Use energy efficient equipments,*