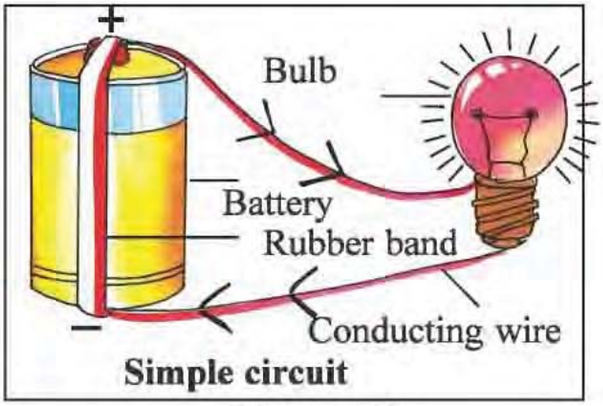
1 Electricity

What is required to switch on radio? When does T.V. get switched off?

With these types of questions, the word 'electricity' gets reflected in your mind. The word 'electricity' is associated in day-today life in this contrary. We see the apparatus like lamps, radio, T.V., fan in which electrical energy is used. Prepare a list of other such apparatus where electric energy is used.

How does a machine or a motor work with electrical energy? How electric lamp (glowsh) illuminates when it is switched on?

What is required? Bulb used in torch, metallic wire (wire which can allow current to pass through it) battery, insulating tape, rubber band etc.....



Simple circuit

Figure 1.1

What to do?

- Get a bulb used in torch and two pieces of conducting wire.
- Connect two pieces of wires with bulb using insulating tape as shown in the figure 1.1.
- As shown in the figure 1.1, connect these two conducting wires with battery (cell) using rubber band.
- Does the lamp glow? (illuminates)?
- Remove any one wire from bulb or battery and note the observation.

We can observe that it is necessary to connect both the terminals of battery using conducting wire with both terminals of bulb for the how of envert thus when it is connected, the path to flow current circuit is completed.

The closed path where the current flows is known as circuit.

Now, connect the wire, battery and lamp as shown in the following figure (1.2) and observe whether the bulb glows or not.

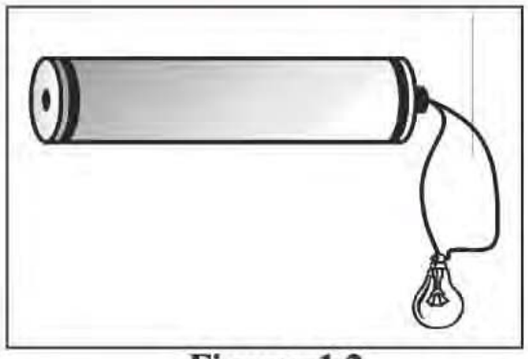


Figure -1.2

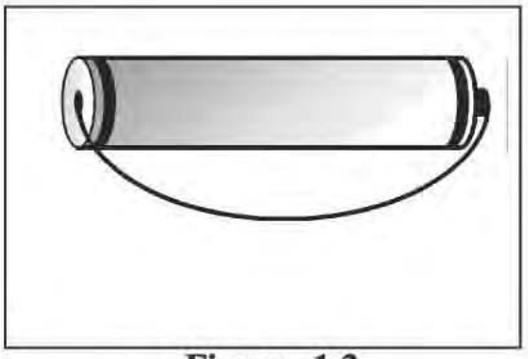


Figure -1.3

Why should one not do like this?

Now, connect the circuit as shown is fig.4 and note observations as per instructions in table.

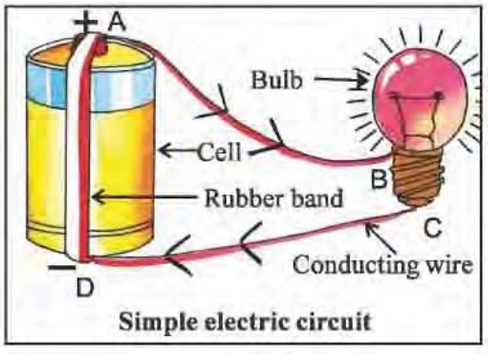


Figure 1.4

Removing end	**observation**-Bulb glows /does no glow
A	
B	
C	
D	

Thus,

- If both the ends of battery are connected at the different ends of the bulb using conducting wires, such closed path is known as "Closed circuit" and current flows in the closed circuit.
- "If one of the ends of the bulb or battery is disconnected or open, then such circuit is known as "Open circuit". The current does not flow in open circuit.

What is required? Piece of thermocol, two pieces of conducting wire, two drawing pins,safety pins, (Pushpins)

What to do?

- Get a safety pin, pass the drawing pin from ring of it.
- Paste it on the thermocole piece as shown.

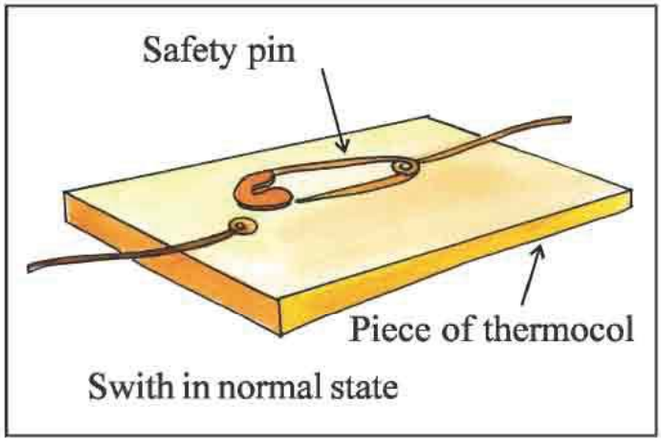


Figure 1.5

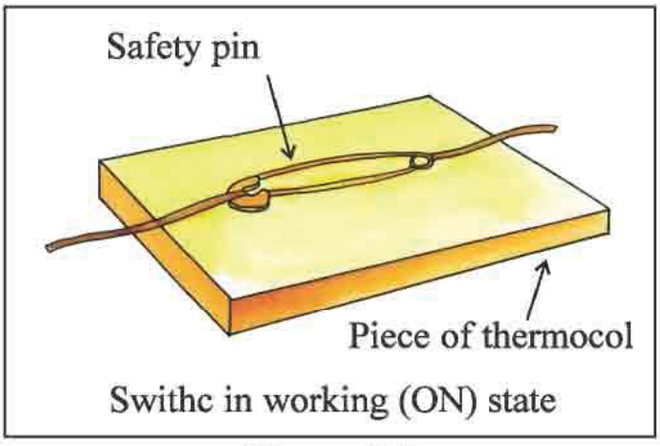


Figure 1.6

- Join the another drawing pin on thermocol board in such a way that the other end of safety pin touches the drawing pin.
- Connect both the conducting wires with drawing pins.
- A switch is ready.

A switch is a device which does not complete the electric circuit in normal (OFF) state and completes the electric circuit in conducting (ON) state.

- **Switch in 'OFF' state ⟶ Open circuit condition**
- **Switch in 'ON' state ⟶ Closed circuit condition.**

Think, whether the electric circuit is completed or not when you switch 'ON' the fan.

What is required? a bulb used in torch, a battery, three conducting wires, an insulating tape, a rubber ban,

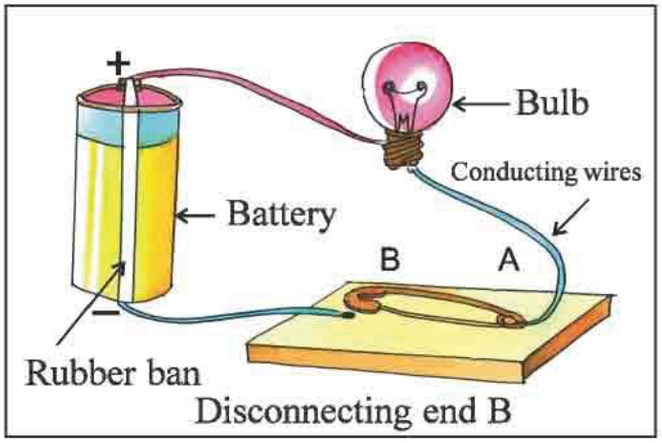


Figure 1.7

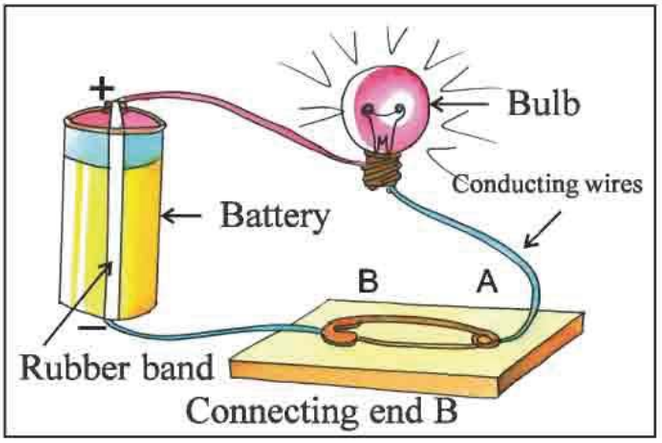


Figure 1.8

What to do?

- Connect one end of lamp with one of the conducting wire of the switch and the other end of the lamp with one end of battery. Connect the other end of battery with the other end of the switch.
- Bring the open end of safety pin in contact of push pin, what happens?

- Remove the end of the safety pin from the contact, what happens?

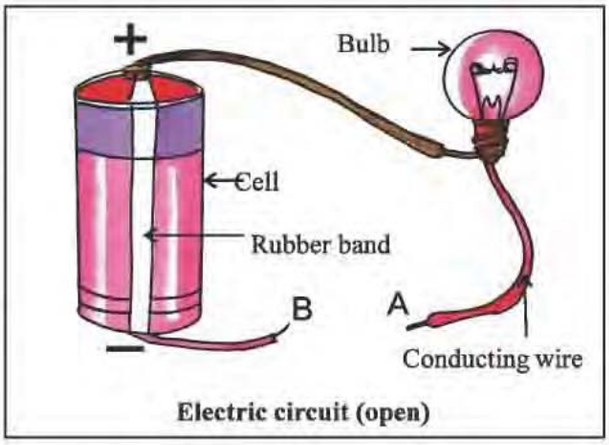
- From the above two observations, you will be able to answer while switching on switch.

Electric conductors and insulators (non-conductors) :

What is required? a bulb, a cell, an insulating tape; a conducting wires, a wooden plank, a pencil, a key, a refill of pen, a match stick.....

What to do?

- Prepare an electric open circuit as shown in the Figure 1.9
- Connect ends A and B with items shown in the following table.
- Observe whether the bulb glows or not and list them in the table.



Electric circuit (open)

Figure 1.9

Sr.No.	Thing (Other things except these can be taken)	Whether bulb glows? yes or no?
1	Rubber	
2	Wooden planck	
3	Pencil	
4	Key	
5	Refill of pen	
6	Match stick	
7		
8		
9		
10		

We can say all the observations of the previous activity :

- Those things when connected to the wires, makes the bulb glow - that means current flows through them.These things are conductor.
- Those items, when connected to the wires, do not make the bulb glow, that means the current does not flow through these items. These thingare non condcutor items. (Materials).

- The things which allow the current to pass through them it are known as electric conductor.
- Ths things through which current does not pass are non-conducting materials or (insulators).

Classify the things taken for activity :

1. Conductors. _____ _____ _____ _____
2. Insulators _____ _____ _____ _____

Use of electricity in daily life is abundant. One can not think life without electricity. Discuss the following questions :

(1) How do the bulbs of bus, rickshaw, bike (Motor bike) glow?

_____

_____

(2) How does a bulb of the torch glow?

_____

_____

(3) How does the circuit get completed in a torch? (Get the torch and observe)

_____

_____

(4) Which item remains on after removal of electric power?

_____

_____

(5) Discuss and note what precautions are to be taken while using electric appliances?

Cautions :

- Do not connect wires directly in the plug.
- Use insulting tape while connecting two ends of wires.
- Do not touch the electric switch with wet hands (why?)
- Do not try to catch the thread of the kite hanging from electric pole.

Use the earthed wire in household wiring.

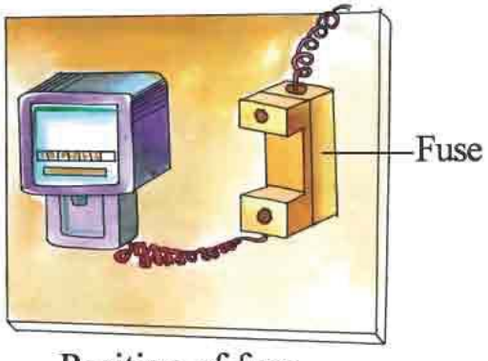
The electric appliances having sign as shown in Fig. only should be purchased. The number of start indicates the level of saving of electricity.

More the stars, more the saving.

Figure 1.10

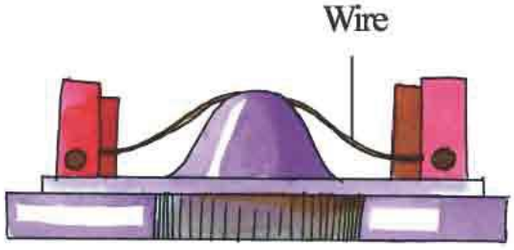
Fuse :

Fuse is seen in the electric circuit in the house, in addition to swith, bulb, tubelight etc.



Position of fuse

Figure 1.11



Fuse

Figure 1.12

- In each fuse, a small, thin, special type of conducting wire is used, which can melt easily. When more current passes through it.When amount of current passing though electric circuit increases beyond certain limit, the fuse connected in electric circuit immediately melts and opens the circuit and stops the current flowing in the circuit. Hence, accident can be avoided.

When fuse goes off...

- Put off the main switchs.
- Remove the remains of the wire from the fuse carefully it may be hot;
- Remove the melted wire of the fuse.
- Connect new fuse wire.
- Connect the fuse assembly.
- Switch 'ON' the main switch.

Note : Our body is a good conductor of electricity, hence care must be taken while working with electric circuits. Use battery while performing all practicals in your text book.

Caution :

You must have noticed the signs as shown here on electric poles and electric appliances. This sign is an indicator of the fact that if proper care is not taken while using these electric appliances, it can bring fatal injuries or even death can occur, hence never tinker with electric wires or electric sockets.

(1) M.C.B. : Are used for the protection from short circuits in electric circuits at home or offices. It has a function like main switch. MCB immediately switches off when short circuits take place.

(2) Vampire power : Many times the appliances like T.V. or computers are switched off using remote sets instead of mechanical switches. Instruments like mobiles can be kept with plug connected even after complete charging. In these cases, appliances use the power and it is a waste of electric energy. That is known as vampire power.

Figure 1.13

Why does it so happen when there is a trouble in light or fan in one room at home, the lights and fans in the other rooms remain on ?

Let us do the following activity to understand above situation.

What is required? Four bulbs used in torch conducting wires, insulting tape, two batteries, rubber bands.

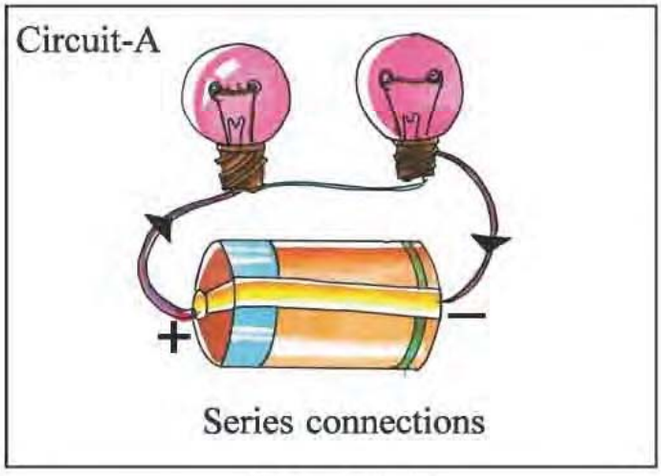


Figure 1.14

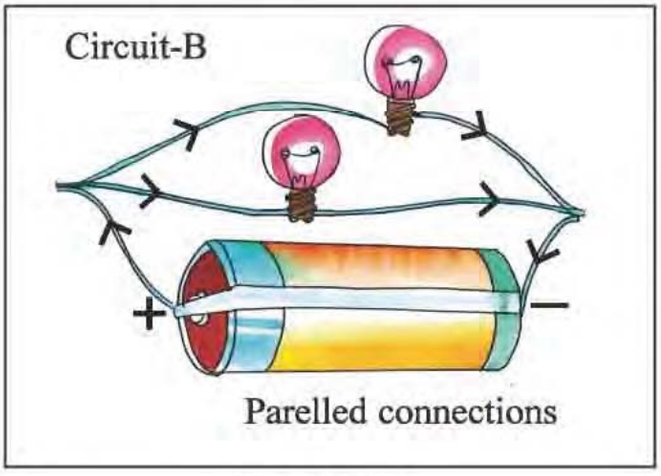


Figure 1.15

What to do?

- Prepare two electric circuits as shown in Fig. 1.14 and Fig. 1.15
- Remove one of the ends of any one bulb connected in circuit A. Write your observations.

- Remove any one end of conducting wire connected with a bulb in circuit B and write you observation.

- What is the conclusion from your observations? Which type of electric connection are used in household electric circuits? Circuit A or Circuit B?

Electric circuit A is a series connection in which there is a single track only for the flow of currents, which gets open when any one wire is disconnected and the current stops flowing through electric circuit.

Circuit B is a parallel connection. There are more than one paths available to flow through bulb or appliances. They are heaving parallel connections, in which only those appliances stop working where wires are disconnected because current stops flowing in that path.

1. Prepare the electric circuit shown here in Fig. 1.16
2. Classify electric conductors and non conductors (insulators) Rubber, plastic, iron, aluminum, match stick, chalk stick, cloth piece, copper wire, key.

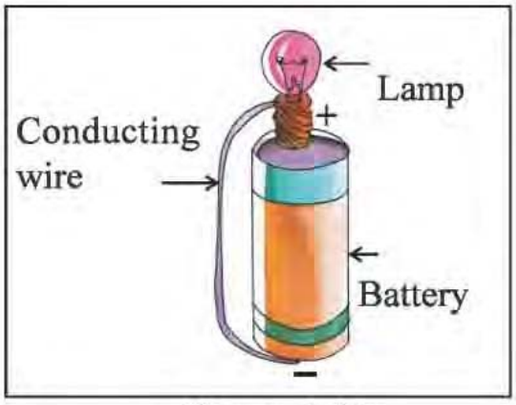


Figure 1.16

Electric conductors :

Insulators :

3. Prepare the list of appliances used at your home and school in which electricity is used.
4. What will you take while working with electric circuits?