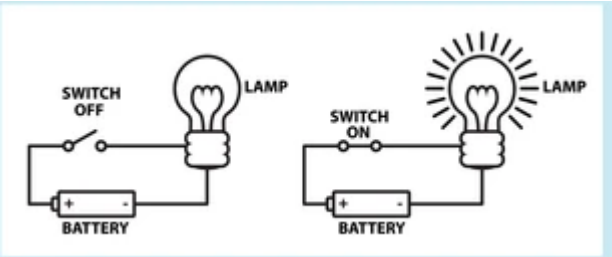
F. Answer the following questions:

Q1. What is the purpose of using electric switch in an electric circuit?

Answer: ***A switch*** is an ***electric device*** that is ***used to complete or break an electric circuit***. If the ***switch is 'ON'***, then a ***current can flow through the circuit***. However, if the ***switch is 'OFF'***, then the ***current cannot flow through the circuit.***



Q2. State two precautions that should be exercised while dealing with electricity?

Answer:

While handling electrical devices, the following precautions must be taken:

1. Insulation must be worn to avoid electricity passing through the body to the ground.

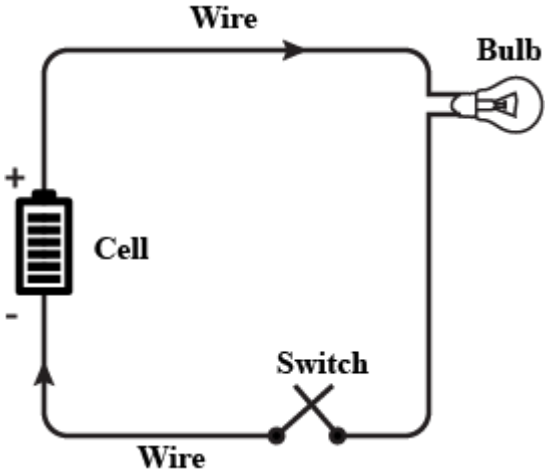
2. The area where the devices are used should be dry. Contact with water must be avoided.

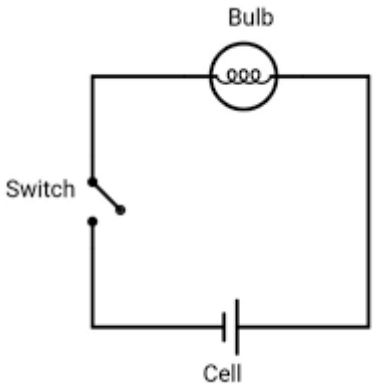
3. Damaged electrical devices must not be used.

4. Devices should have an earthing wire connected to them.

Q3. Draw a closed circuit using symbols of an electric bulb, cell, switch and connecting wires?

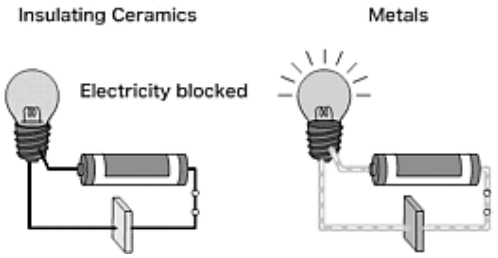
Answer:

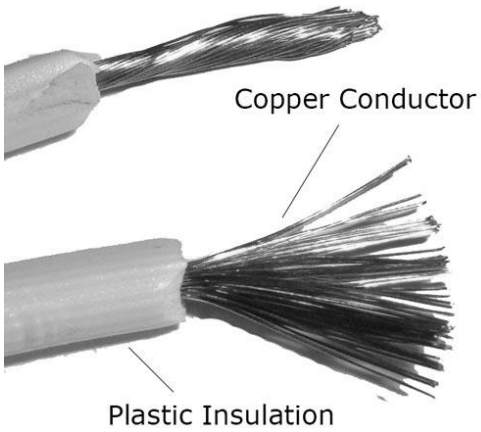




Q4. How are insulators important in electric circuit?

Answer: ***Insulators*** are those substances ***which do not conduct electricity***. Since direct contact with electrical circuits can be fatal as an electric current can cause fatal burns. Insulators give protection against electric shock.





Q5. What are the essential components in an electric circuit?

Answer: In general, a circuit has the following components:

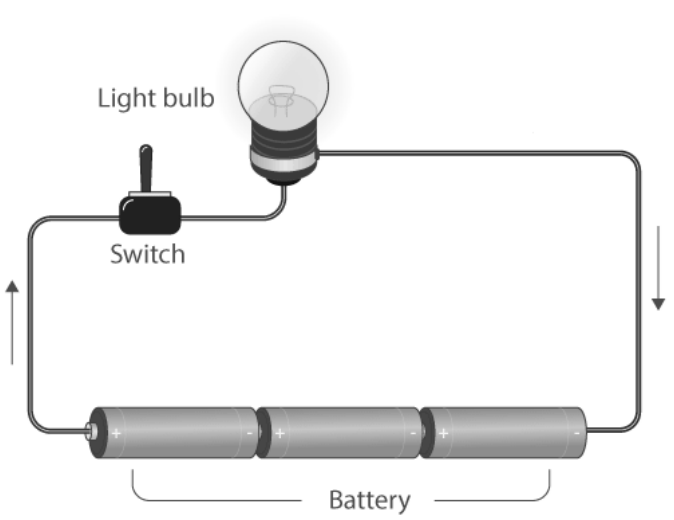
1) A cell or battery: source of electricity

2) Connecting wires: Act as conductor to flow electric current

3) Key or switch to control the circuit

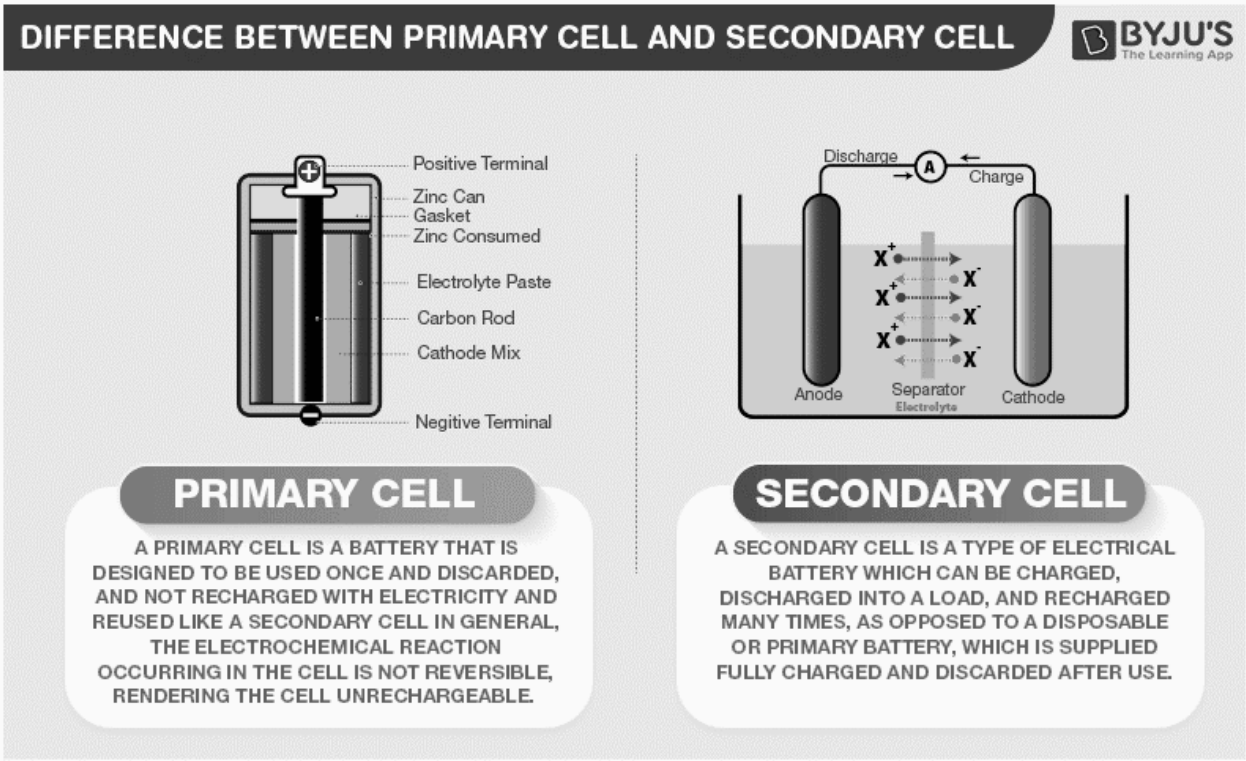
4) Bulb or electric device act as a load to the circuit

Metal wires are used in electric circuits because the metals are good conductors of electricity and allow current to pass through them.



Q6. How are dry cells different from the chargeable cells?

Answer: ***Chargeable cells*** are ***different*** from ***ordinary cells*** because ***they can be recharged after they are used up***, while ***ordinary cells can't be charged*** once they are used up. Usually, chargeable cells are more expensive than ordinary cells.

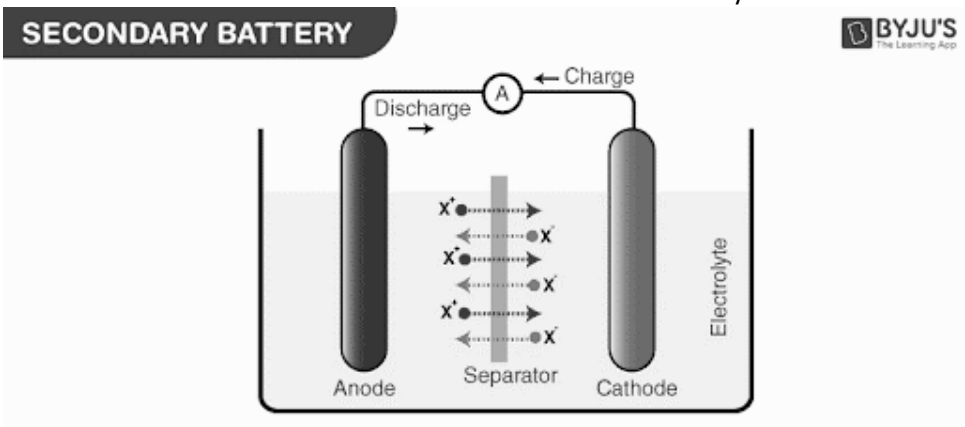


Q7. What are secondary cells?

Answer: The cells from which the ***electric energy is derived from the reversible chemical reaction*** are called ***secondary cells***. Some examples of secondary cells include a lead-acid accumulator, nickel-cadmium (Ni-Cd), nickel metal hydride (Ni-MH), lithium-ion (Li-ion), etc.

(Primary cells are the ones which cannot be recharged and have to be discarded after the expiration of the lifetime whereas,)Secondary cells need to be recharged when the charge gets over

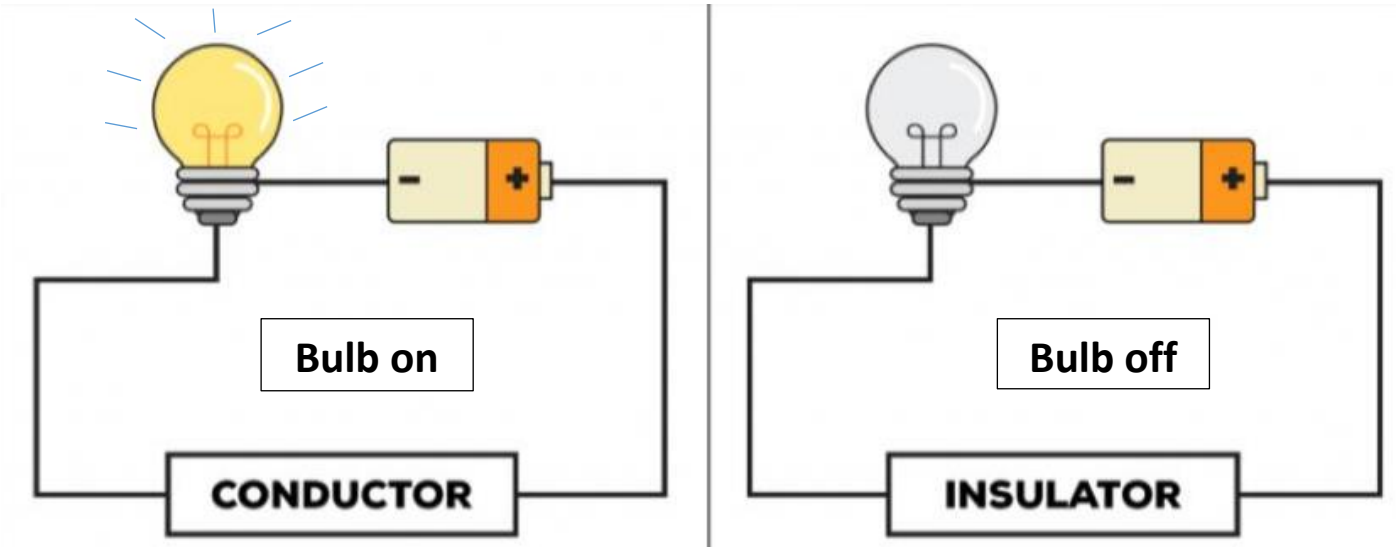
A secondary cell is a cell that is designed to be recharged with electricity and reused many times. *In general, the electrochemical reaction occurring in the cell is reversible, and so these cells can be recharged.)*



Q8. State two uses of conductor and insulator of electricity?

Answer: ***Conductors*** are used in a wide range of applications, including ***electrical wiring, transmission lines for electricity, electronic circuits***. (Conductors are also used in various industries for heating, such as in electric stoves and industrial furnaces.)

Electrical insulators hinder the flow of electron or passage of current through them. So, we use them extensively in circuit boards and high-voltage systems. They are also used in coating electric wire and cables.



(Copper, Brass, Steel, Gold, and Aluminium are good conductors of electricity. We use them in electric circuits and systems in the form of wires.(Conductors are metals that make electrical wires)

(The substances which allow electric current to flow through them easily are called conductors. Examples: Impure water and metals.

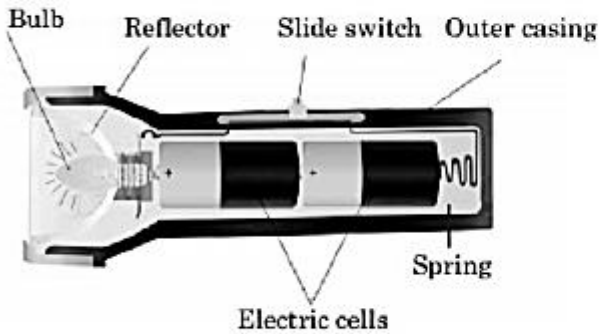
The substances which do not allow the electric current to flow through them are called insulators. Examples: Rubber and wood.)

Q9. Where did the word electricity originate from?

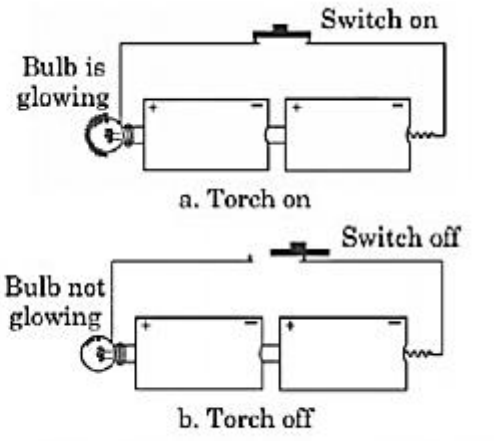
Answer: The Greeks first discovered electricity about **3000 years ago**. Its name came from the word "**elektron**", which means amber. **Amber** is the yellow, fossilised rock you find in tree sap. The Greeks found that if ***they rubbed amber against wool, lightweight objects (such as straw or feathers) would stick to it.***

Q10. Draw a neat labelled circuit diagram of a torch?

Answer:



▲ Fig. 13.4 Cross-section of a torch



▲ Fig. 13.5 Circuit diagram of a torch

Q11. Differentiate between the following?

a. Open and closed Circuit

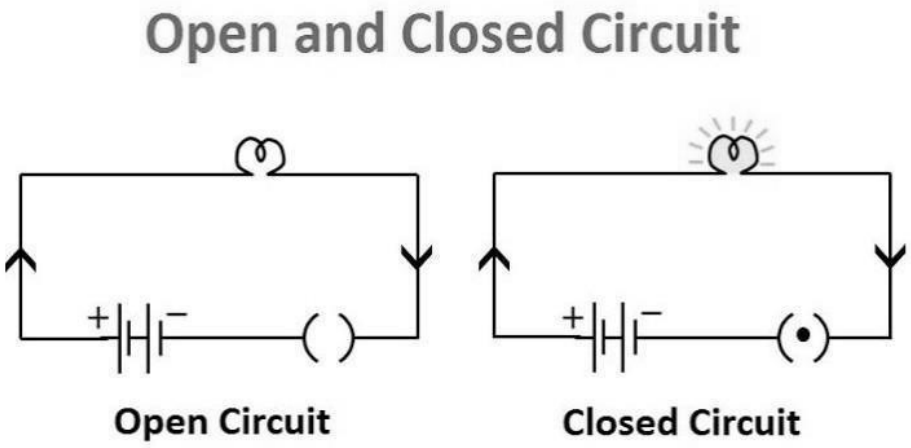
b. conductor and insulator of electricity

Answer:

a. Open and closed Circuit

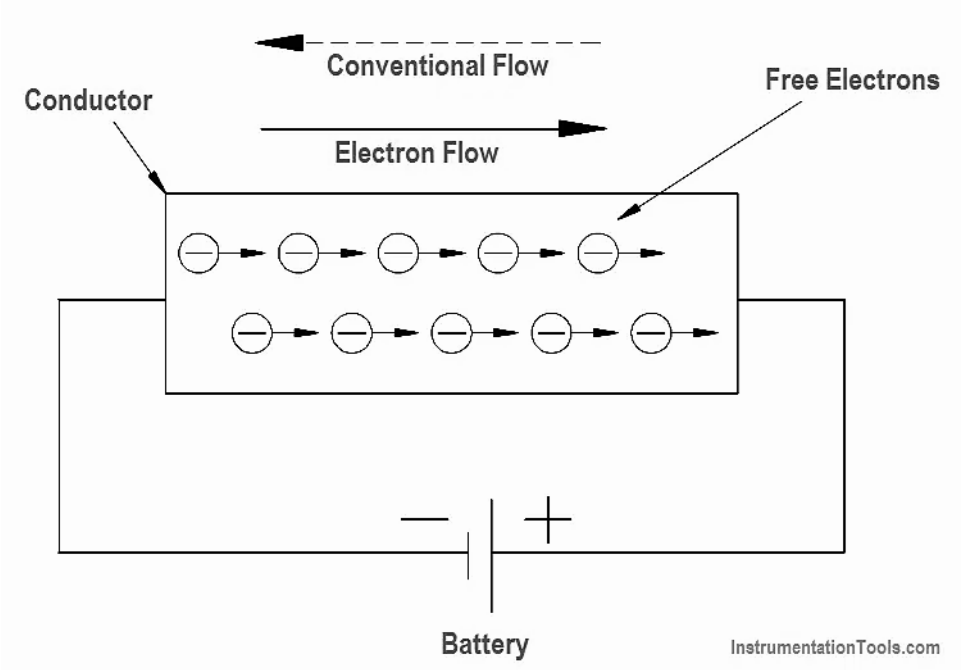
Open circuit: An open circuit is a circuit in which the ***path is incomplete*** which means there is ***no flow of current***.

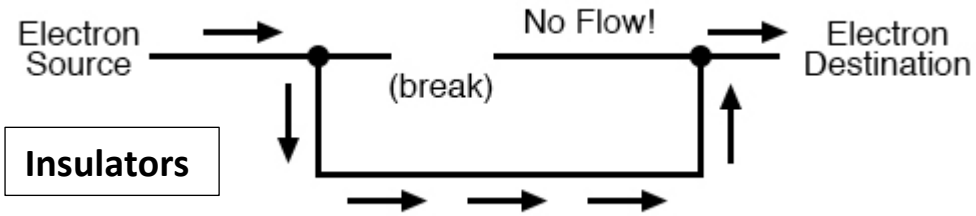
Closed circuit: A closed circuit is a circuit in which the ***path is complete*** and there is a ***flow of current in the entire path.***



b. conductor and insulator of electricity

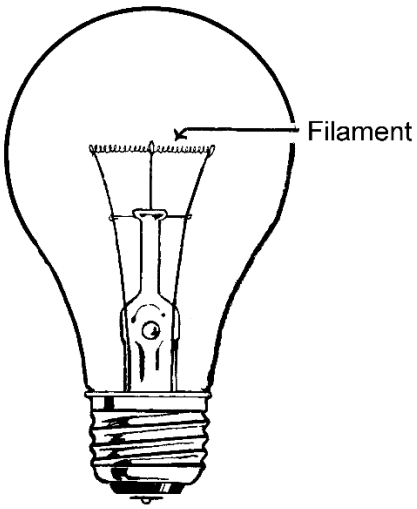
A ***conductor*** is a material that ***allows electrons to flow freely through it***, making it useful for carrying electric current. An ***insulator*** is a material that ***resists the flow of electrons***, so it does not allow electric current to pass through it.





Q12. What are various possibilities for the bulb not to glow in an electric circuit?

Answer:



If the ***filament of a bulb is broken*** it is said to be a ***fused bulb*** that is that the bulb will not glow as the filament is the main glowing part of a bulb. Since, the ***filament is broken***, the ***circuit is incomplete***, and thus, bulb will not glow.

Some ***connections*** may be ***loose or faulty***. **Battery is weak**, so the current is not strong enough to light the bulb.

Q13. Give reasons:

a. Electricians are advised to wear rubber gloves while working on electrical devices.

b. Electric switches and board are made up of plastic.

c. One should not touch switches with wet hands.

Answer:

a. Electricians are advised to wear rubber gloves while working on electrical devices.

Rubber is an insulator and does not allow the passage of electric current through it. So when electricians wear rubber gloves electric current cannot pass through them and they don't get a shock.

b. Electric switches and board are made up of plastic.

Electrical plugs, switches and plug-boards are made up of thermosetting plastics because it is a bad conductor of electricity. It does not allow the electric current to pass through it, thus safe in using in electric appliances.

c. One should not touch switches with wet hands.

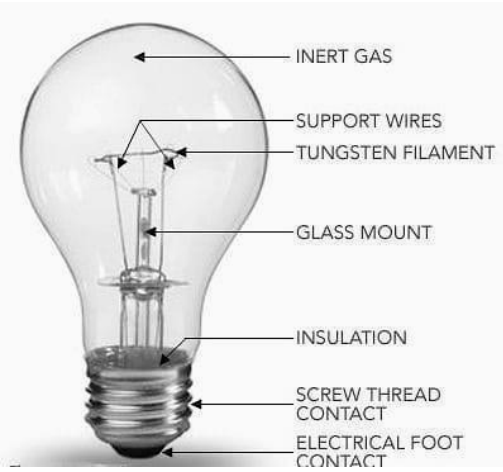
Electric switches should not be operated with wet hands because water is a good conductor of electricity, so the user may get electric shock.

Q14. What will happen if both the terminals of cell are directly connected without connecting them through switch and bulb?

Answer: If we directly connect the two terminals of a cell without connecting them to a switch or a bulb then the ***chemicals in the electric cell will get used up very fast***. Eventually, the cell will get ***discharged and stop working.***

This is because the ***positive and negative terminals*** of the battery would be directly connected, ***allowing a large current to flow between them***. This can be dangerous and may cause the ***battery*** to ***overheat, leak, or even explode.***

Q15. Filament of an electric bulb is made up of tungsten and not any other materials. Why?

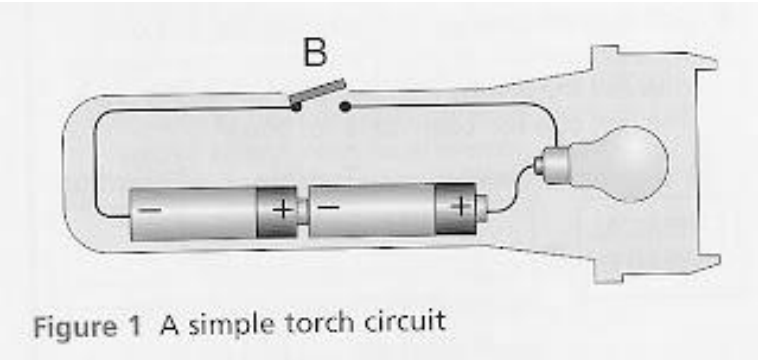


Answer: The ***bulb transforms electrical energy into light and heat energy***. The ***bulb filaments need to withstand high temperatures and pressure***. And also, it is essential to ensure that it does not alter the filament structure due to heating effects.

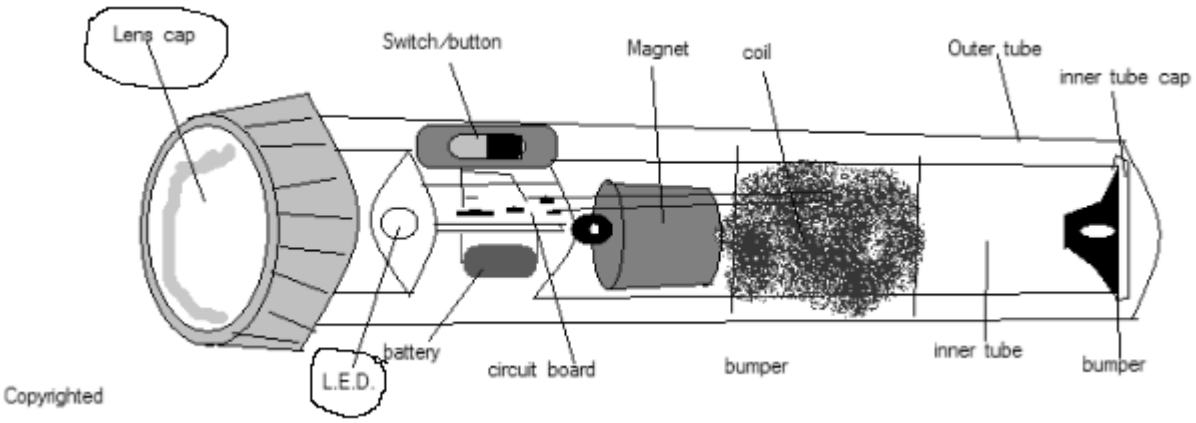
Tungsten, a metal with the ***highest melting point of all the elements***. Tungsten has superior electrical conductivity and acts as an excellent thermal conductor. It is ***very malleable*** and can be ***drawn into the wire*** with the ***highest tensile strength*** of all pure metals.

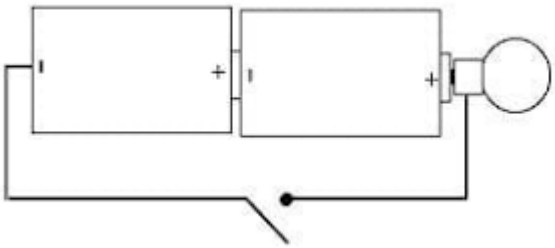
Q16. Your brother has made a battery –operated torch using two cells and has come to ask you how he may make the torch more powerful. What would you advise him?

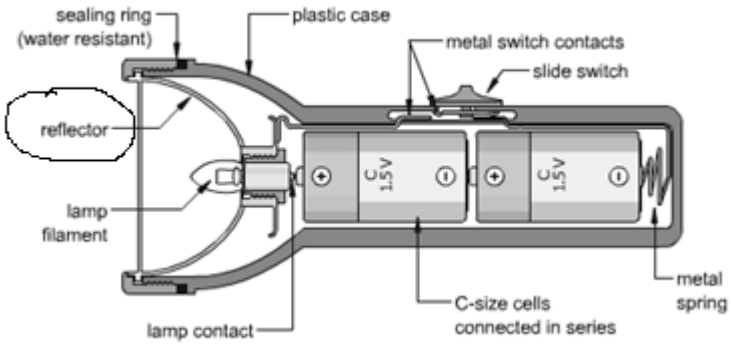
Answer:



- Using ***high voltage cells***.
- Using a good quality lens.
- Using a more ***shiny and clean reflector*** of torch.
- Using a Good quality ***LED bulb***.
- ***Connection*** between ***wires and bulb*** and cells should be proper.







Q17. What kind of cells would you use in the following cases?

(a) Car (b) Transistor Radio (c) Hearing aid

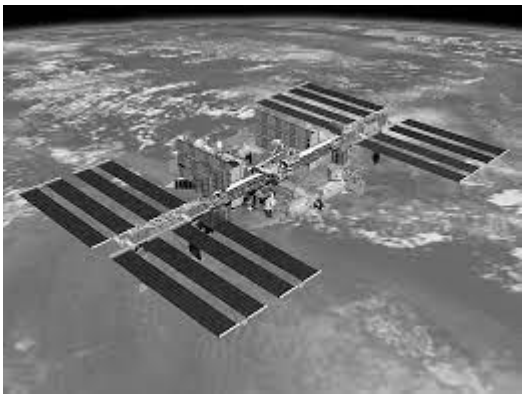
Answer:

(a) Car batteries are ***lead-acid batteries***. Lead-acid batteries are classified as secondary batteries.

(b) Zinc–carbon ***dry cells*** are used in transistor radio

(c) ***Mercury cell*** is suitable for low current devices like hearing aids, watches, etc.

Q18. Why solar cell are used as a source of power in satellites?



Answer:

Solar cells are used as a source of power in satellites because they can ***convert sunlight directly into electricity***. Satellites ***operate in the vacuum of space*** where there is no atmosphere to scatter or absorb sunlight, so solar cells can generate power efficiently.

Q19. Instead of plastic, can the electric wires be covered with aluminium foil?

Answer: No, the electric wires at home cannot be covered with aluminium foil instead of plastic because ***aluminium is a conducto***r. It ***does not save us from electric shocks*** and also, does not prevent from electric fires.