



*Dr. Bbosa Science*

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## **Electricity**

This is a form of energy that is produced by moving electrons or electrical charges. There are two types of charges; positive charges and negative charges.

### **Sources of electricity**

Some examples of sources of electricity are:

- batteries (torch and car batteries)
- bicycle dynamos
- hydro-electric generators
- petrol and diesel driven generators
- wind driven turbines
- geothermal generators
- solar energy (panels)

### **Forms of electricity**

- (a) static electricity
- (b) Current electricity
- (a) Static electricity**

It is a type of electricity whose charge do not move. It produced when two nonconductors are rubbed together such as plastic ruler and hair.

## **Lightning**

Is an application of electricity.

It is produced when positively and negatively charged clouds meet causing a spark of light (lightning).

The thickened air expand and vibrates vigorously producing sound or thunder.

**NB. Lightning and thunder takes place almost simultaneously by lightning is seen first because light moves faster than sound.**

Dangers of lightning

Lightning produces a lot of electrons and heat that can burn objects like houses and organisms such as cattle and human beings

## **Avoiding being hit by lightning**

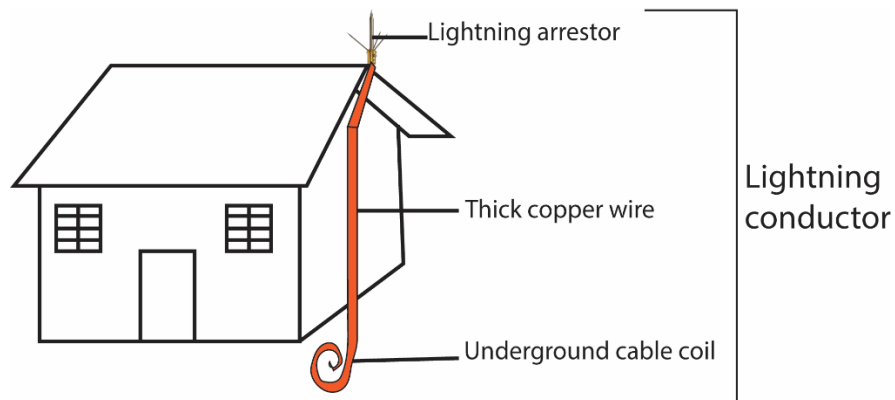
- Close windows and doors.
- Don't take a bath or shower during a thunderstorm, especially if you're out in the countryside where homes and lines of communication are not as well protected against lightning.
- Don't light a stove or fireplace - the smoke coming out of a chimney has high conductivity and increases the likelihood that lightning will strike your home.

The main rule here is to keep as far away as possible from everything that rises up from the ground and also anything connected to bodies of water or made from metal:

- Reservoirs are very dangerous during thunderstorms. If you find yourself close to or in the water, move a distance of no less than 30 meters away.
- Stay away from chain-link fences and large metallic objects.
- Don't move. Instead, take cover under some low bushes if possible. Don't under any circumstances shelter under a tree. In fact, stay at least 20 meters away from them.
- If you're in a field and there aren't any bushes, squat down. You can also take cover in a trench or a ditch.
- It's still not proven that cell phones attract lightning, but it's best to be cautious and turn them off.
- Don't stand near a bonfire - the pillar of hot air conducts electricity very effectively.

## Lightning conductor

It protects the building against lightning by conducting electrons to the ground. It is made of sharp copper arrestors on the top of the building and a thick copper wire conductor to the ground.



## (b) Current electricity

This is a kind of electricity that moves through wires in form of electron.

Sources of current electricity

These include Car batteries, bicycle dynamo, hydroelectricity generators, thermos generators, wind driven turbines, solar panels.

Hydroelectricity is the cheapest and most reliable source of current electricity.

Uses of current electricity

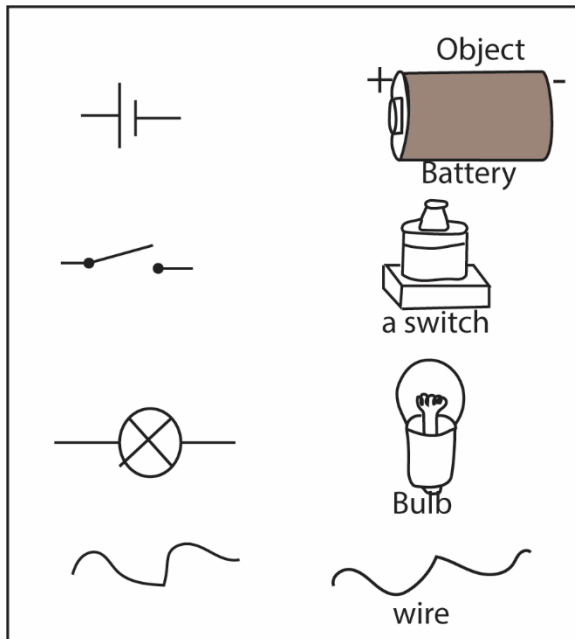
- (i) Cooking
- (ii) Ironing
- (iii) Powering of radios and television
- (iv) Refrigerators
- (v) Running of industrial equipment

## Electric circuit

An electrical **circuit** is a path or line through which an electrical current flows to allow electric appliance work.

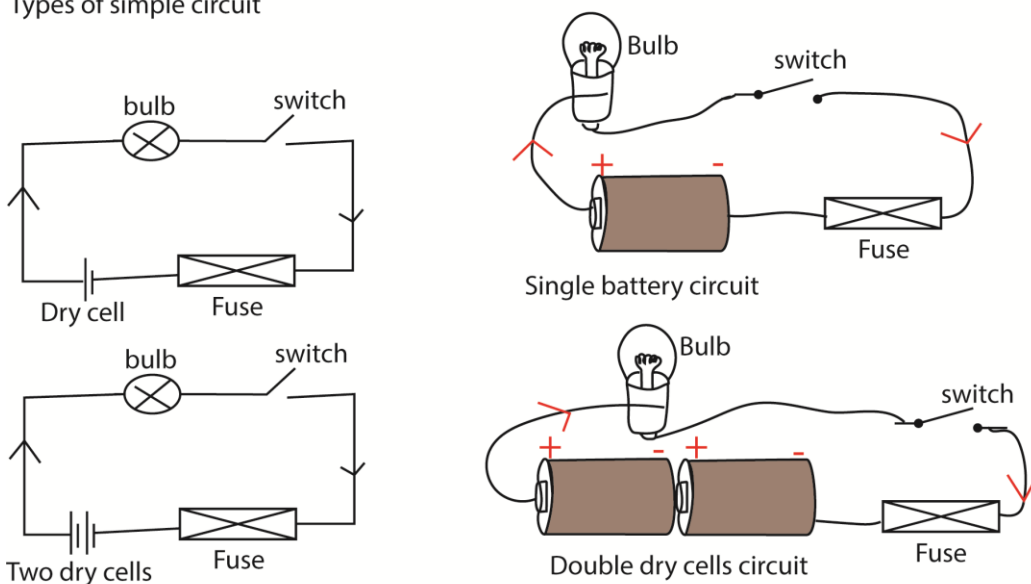
A simple circuit consists of a bulb, copper wires, a battery or two batteries and a switch.

Symbols may be used to represent the components of a circuit. These symbols are shown below.



Electricity in a circuit flows from the positive terminal of battery/dry cells all around the circuit and back to the negative terminal of the battery. A simple electric circuit is shown below:

Types of simple circuit



Note that current moves from positive terminal through the wire to negative terminal

## Importance of components of a circuit

- (i) **Battery or dry cell generate current in the circuit**
- (ii) **Bulb gives out light and heat**
- (iii) **Switch breaks and completes the circuit as required**
- (iv) The fuse breaks the circuit in case of short circuit or voltage overload protecting electrical devices against overloads and short circuit. Its essential component is a metal wire or strip that melts when too much current flows through it, thereby interrupting the current.

## Good and bad conductors of electricity

Good conductors are materials that allows electricity to pass through them easily; examples are metals and graphite.

Poor conductors of heat allow small amount of heat.

Bad conductors of heat are materials that do not allow electricity to pass through. They are also called insulators, e.g. wood, paper, clothes and plastic.

## Electric appliances at home and their uses

Machines which use electricity to work or operate, are known as electric appliances. At home there are many electrical appliances. Examples of domestic appliance and their uses are listed in the table below:

Appliance	Its use at home
Iron box	Ironing clothes
Radio	Provide information and entertainment.
Television	Providing information and entertainment
Cooker	Preparing food
Electric kettle	Boiling water

These appliances are shown below:

## Electrical appliances at home



Iron box



Radio



Kettle



Cooker



Television

### **Safety when dealing with electricity**

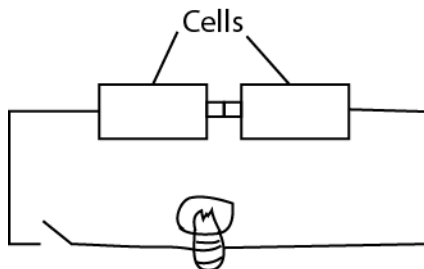
In as much as electricity can be useful to us, it can also be very dangerous to our lives. All electric appliances need to be handled with care.

Some safety measures when **dealing with electricity** are:

- Do not touch a non-insulated (bare) electric wire
- Do not touch switches with wet hands
- Do not put your fingers, sticks, pencils or wires in electric sockets
- Do not overload electric circuits.

## Revision questions and answers

1. David connected the circuit as below. Explain why a new bulb did not light when the on a switch is closed?



**The cells were not connected properly.**

2. What is the function of a dry cell?

**Produces current I the circuit**

3. Uganda electricity Board generates most of it electricity at Jinja.

- (a) State the source of electricity energy

**Running water**

- (b) How does the electricity generated at Jinja get to a consumer in Kampala?

**Transmitted through wires**

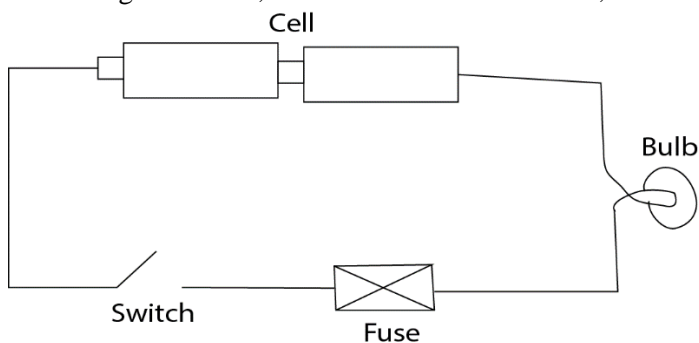
- (c) Give two uses of electricity to a family?

**Providing light at home**

**Cooking**

**Enable the use of electric appliance e.g. Radio, T.V set**

4. In the diagram below, when the switch was closed, the bulb lit.



- (a) How can you increase the brightness of light in the bulb?

**By using newer dry cells**

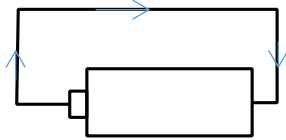
- (b) After a short time, the switch was still on, the light in the bulb went off. State three possible causes for the light going off.

(i) **The fuse could have broken the circuit due to high voltage**

(ii) **The bulb blew**

(iii) **The cell could be used up**

5. In the diagram below indicate using an arrow the direction of the flow of electricity.

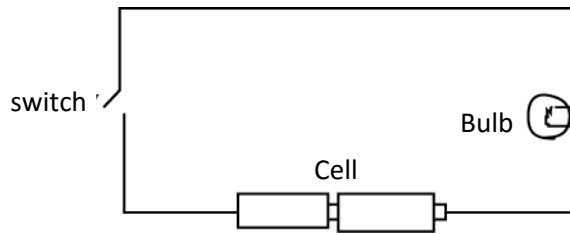


NB. Current moves from positive to negative terminal

6. Lightening is dangerous to man
- (a) State two precautions you would take to avoid being struck by lightning.  
**Putting lightning conductors on buildings**  
**Not standing under the tree during rain**
- (b) Which forms of energy does lightening have?  
**Light energy**  
**Sound energy**  
**Heat energy**
7. Explain why light is seen before sound is heard during lightening.  
**Light travels faster than sound**
8. Uganda electricity board generates its electricity at Jinja.
- (a) How does electricity reach a consumer in Mbale?  
**It is transmitted by wires**
- (b) Give two uses of electricity,  
**Provide light for seeing**  
**Provide eat for cooking**  
**Provide heat for ironing**
- (c) Name the causes of short circuit.  
**Uninsulated wires**  
**Poor insulation**
9. Give one example on how man uses water to produce energy.  
**For production of hydroelectricity**
10. a) What is the use of fuse in a circuit?  
**Prevents short circuit**
- (b) Give three reasons why a bulb of torch may not give light when the switch is on.  
**Improper arrangement of batteries**  
**Loosely fixed bulb**  
**Rusty or non-functioning switch**



11. (a) Draw two dry cells arranged correctly and ready to give light in a bulb.



- (b) If you get a new torch with new dry cells and new working bulb in place, but when you switch it on, the bulb does not light. Suggest two possible problems with the torch.
- Improper arrangement of battery cell
  - lose connection of the bulb
  - Switch could be nonfunctional

12. (a) What enables a drum to produce sound when it is hit with a stick?

**By vibration of the skin**

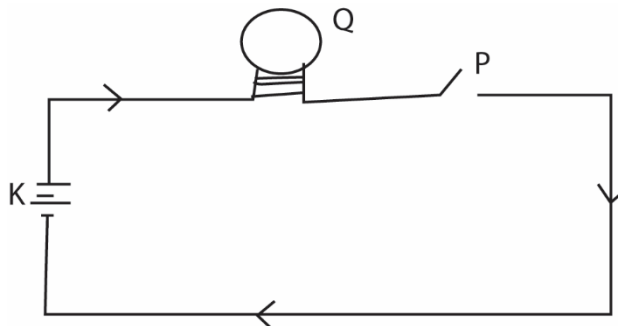
(b) Give a clear example that shows that light travels faster than sound.

**A lightening is seen before thunder.**

(c) State two ways in which sound can be stored.

- (i) **Compact disc**
- (ii) **On cassettes**
- (iii) **Tape recorder**
- (iv) **On the computer**

13. The diagram below shows an electric circuit. Use it to answer the questions that follow.



- (a) Name part K: two **battery cells**
- (b) Name part P: **switch**
- (c) Give the type of energy that are produces at Q when P is closed.
- Light energy**
- Heat energy**

14. (a) What type of electricity is generated at Jinja?

Hydroelectricity

(b) What is the difference between solar and thermal electricity?

Solar electricity is obtained from sunlight whereas thermal energy is obtained by burning fuel.

(c) Give any two advantages of solar electricity over the thermal electricity.

(i) Minimize destruction of forests

(ii) does not produce poisonous gases

(iii) it is cheap

15. (a) Why do people who work on electric wires wear rubber gloves?

**To prevent being electrocuted**

(b) Give any one use of each of the following:

(i) a switch **breaks the circuit and completes the circuit**

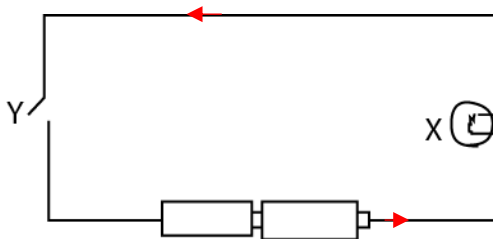
(ii) a fuse **breaks the circuit when there is a short circuit**

16. Why is thunder heard after lightning has been during a rainy day?

**Because light travels faster than sound**

17. The diagram below is of an electric circuit

*Use it to answer the questions that follow*



(a) Name the parts labeled **Y** and **X** in the diagram

(i) **Y**: switch

(ii) **X**: bulb

(b) Apart from light give any one other form of energy produced by the part labeled **X** when **Y** is closed.

**Heat energy**

(c) Show with the help of arrows the flows of current in the above diagram.

**NB. Current moves from the positive to negative terminal**

18. The diagram below shows wooden poles with electricity wires.

*Use it to answer the question that follow*



(a) State any one reason why the wires are loosely fixed.

**To allow room for contraction and expansion of the wires**

(b) What would happen to the wires if they were tightly fixed?

**They would break when they are contracted on cold days.**

(c) Give any one reason why wooden poles are usually used to carry electricity.

**To protect people and animals from electroshock when they touch the poles.**

(d) Why are the wires placed very high up?

**To reduce theft of the wires**

**To prevent children reaching up the wire**

19. 14. Suggest any one way in which human beings use energy light the sun.

**To see**

**To make solar electricity**

20. State any one function of each of the following parts in simple electric circuit:

(i) Wire **conducts electricity.**

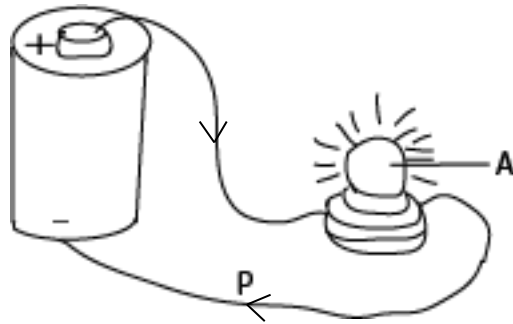
(ii) Battery **is the source of current**

(b) Mention any two causes of a short circuit

(i) **high voltage**

(ii) **contact of naked wires in a circuit.**

Use it to answer questions and 21 and 22



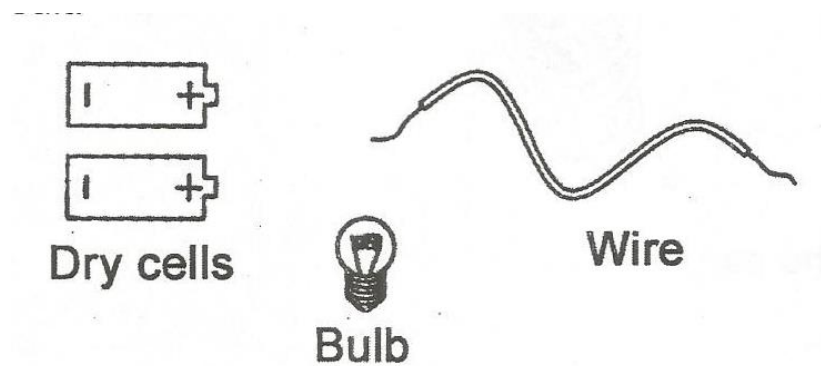
21. Draw an arrow on line **P** to show the direction of the flow of electricity.

**NB. Current moves from the positive to negative terminal**

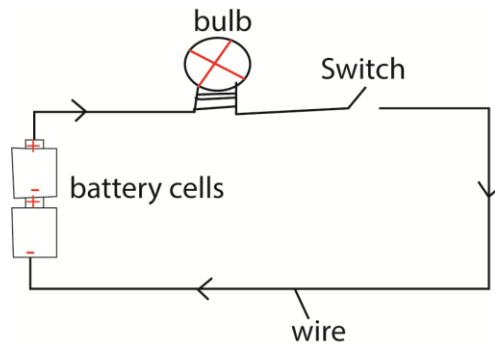
22. In which way is a fuse similar to a switch in a simple electric circuit?

**Both break the circuit**

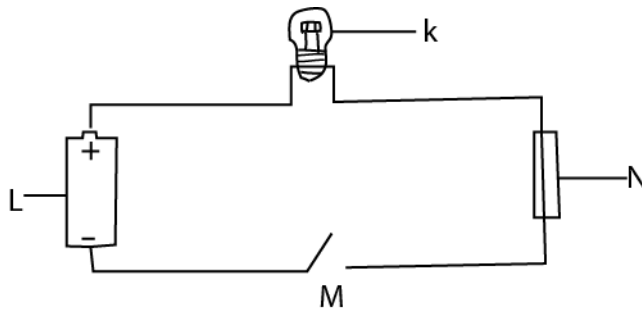
23. Arrange the part of an electric circuit below by drawing to show a complete circuit.



Solution



24. Study the diagram of an electric circuit below and use it to answer the questions that follow



- (a) Name the parts marked K and N
- (i) K: bulb
  - (ii) N: Fuse
- (b) State the energy change that takes place at L when M is closed  
**Chemical energy is converted to electric energy.**
- (c) Give any one form of energy produces at K when M is closed  
**Light and heat**
25. What form of energy is produced by dry cell?  
**Electrical energy**
26. What type of electricity is lightning?  
**Static electricity**