

# **SOME NATURAL PHENOMENA - Lightning**

- **History of Electric spark**
- **Basics of charges**



# **SOME NATURAL PHENOMENA**



**ELECTRIC KETTLE**

Long distance can be travelled in a short span of time

Heating water would not be possible without fire and us is now in our control.

ELECTRIC

ELECTRIC



Boiling water at the touch of a button

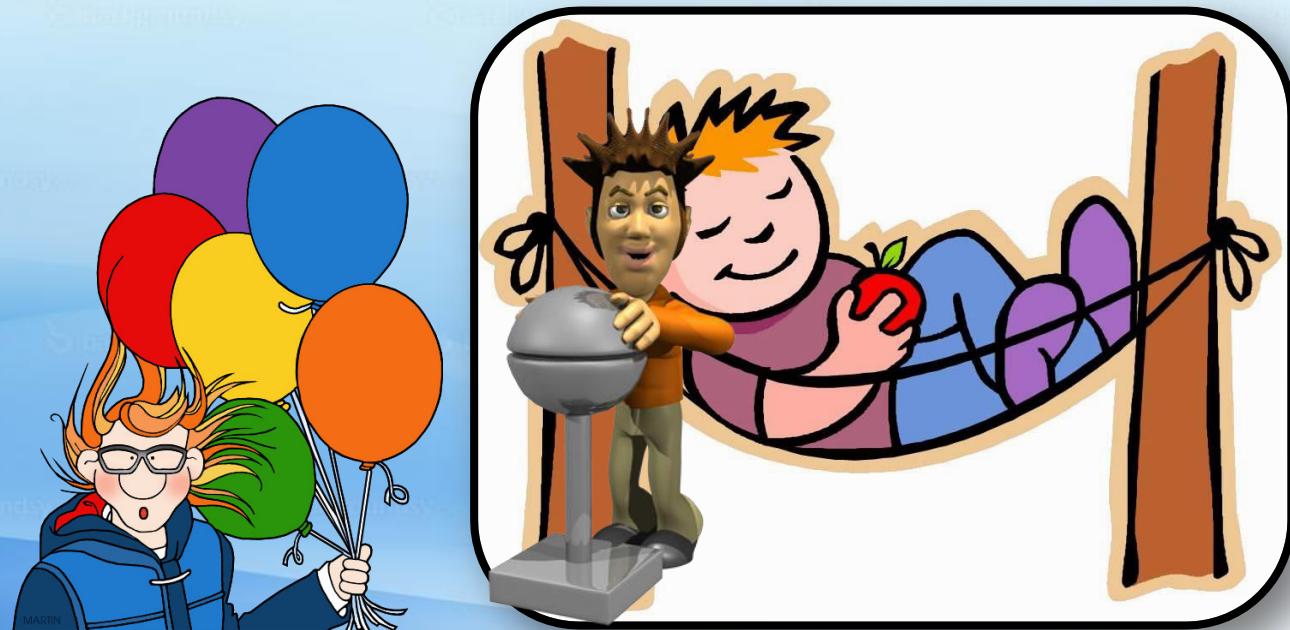
These are examples of

Electricity. among them ???

**CHARGE IN MOTION**  
hours

In this chapter, we will talk about

# STATIC ELECTRICITY



# LIGHTNING



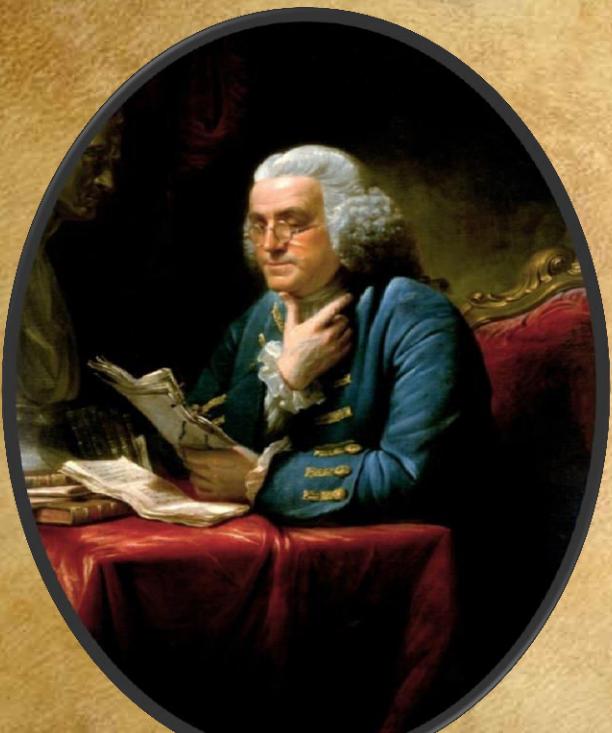
## HISTORY OF CHARGES



**THALES (600 B.C.)**



## HISTORY OF CHARGES



**BENJAMIN FRANKLIN (1752)**



# BASICS OF STATIC ELECTRICITY

Symbol of proton is

p<sup>+</sup>

Symbol of electron is

+ becomes p  
- becomes e

Positive charge  
Negative opposite charge

The charges on a proton and electron are numerically equal.

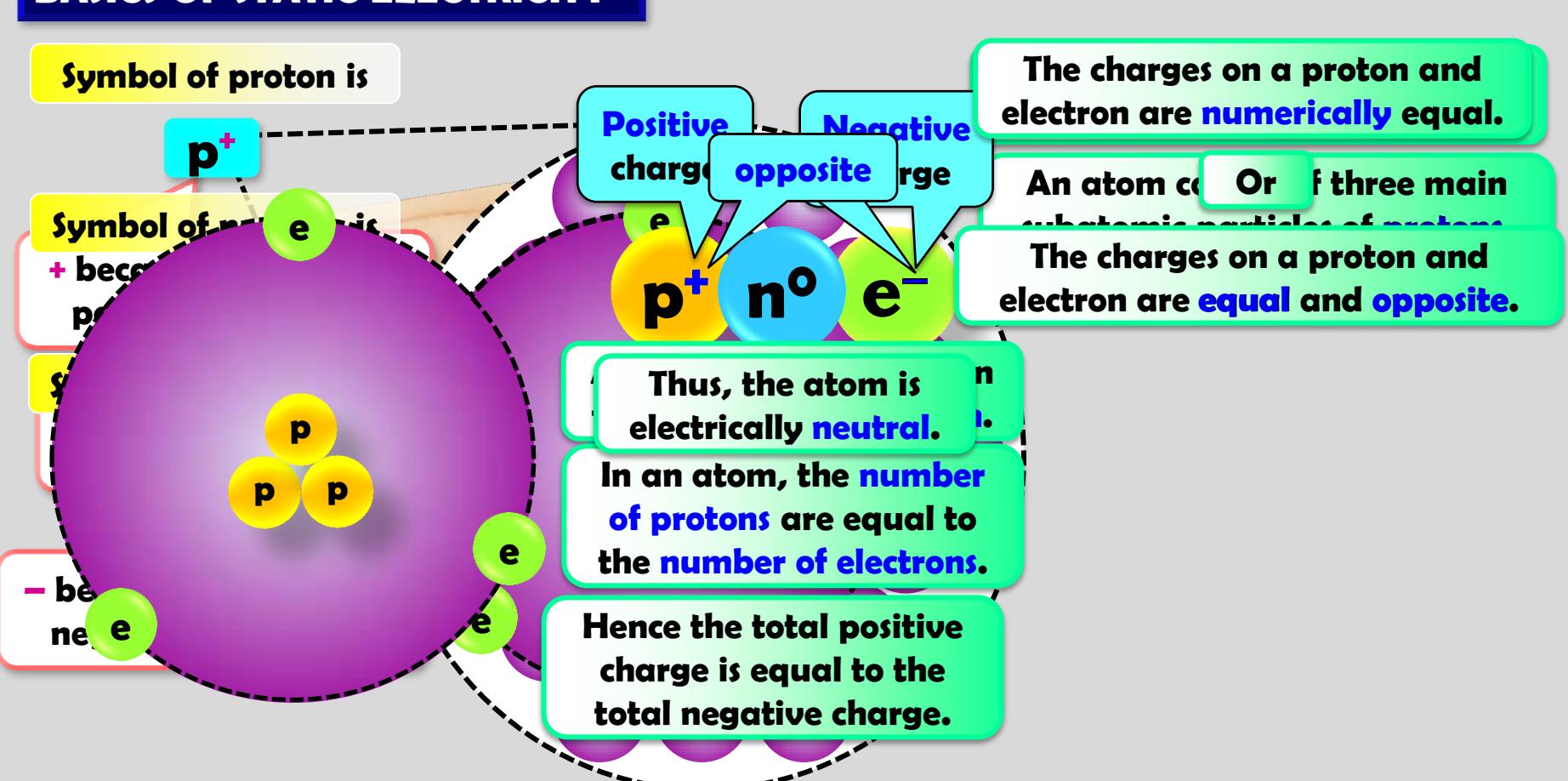
An atom consists of three main subatomic particles of matter.

The charges on a proton and electron are equal and opposite.

Thus, the atom is electrically neutral.

In an atom, the number of protons are equal to the number of electrons.

Hence the total positive charge is equal to the total negative charge.



# **SOME NATURAL PHENOMENA - Lightning**

- **Types of charges**
- **Charging by rubbing**

## TYPES OF CHARGES

### FREE ELECTRON



## TYPES OF CHARGES

Objects which acquire a charge are called **CHARGED BODIES**.

Positive charge



Polythene

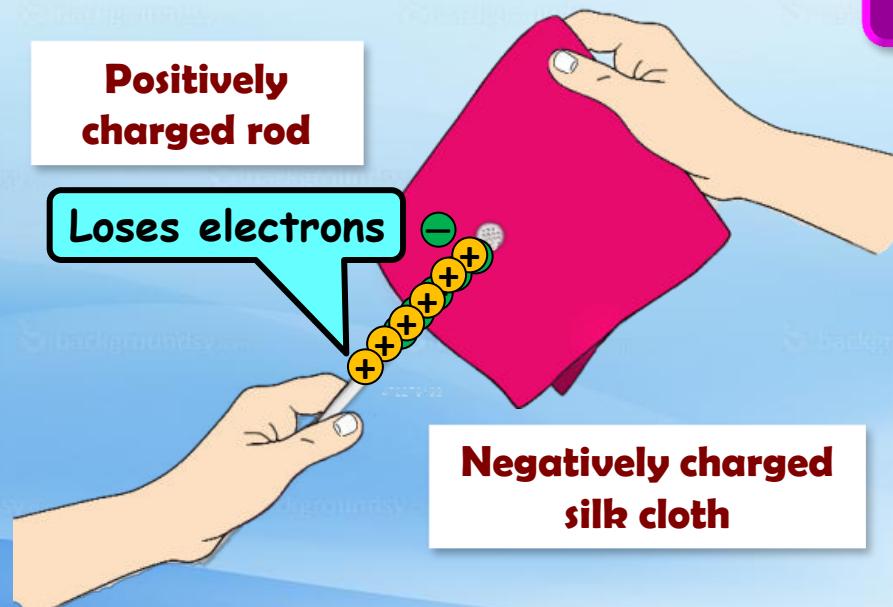


Plastic straw

Hence, It has a  
Negative charge

## CHARGING BY RUBBING

On Rubbing, Electrons Move From Glass Rod To Silk

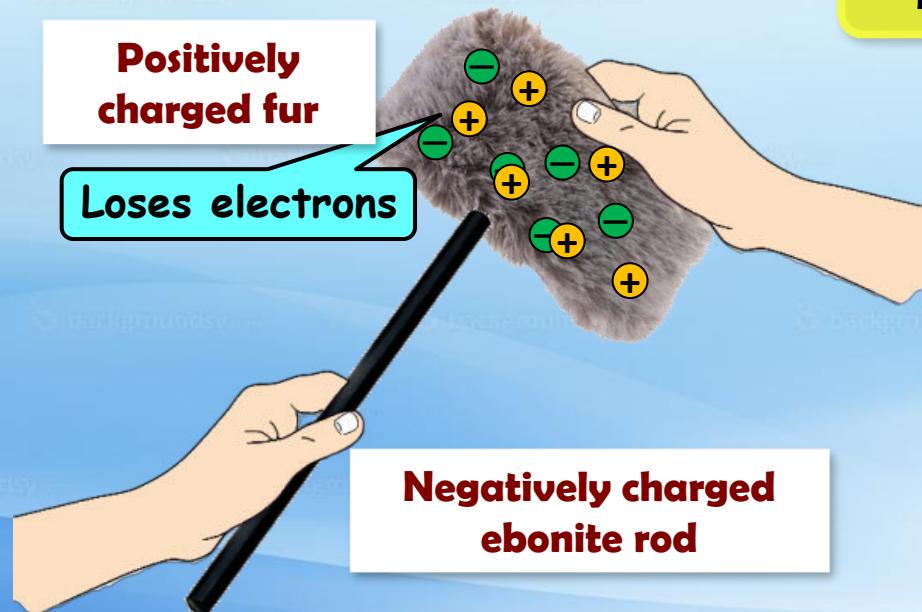


Thus due to loss of electrons, the glass rod gets a **POSITIVE CHARGE**.

The silk gets an equal amount of **NEGATIVE CHARGE**.

## CHARGING BY RUBBING

On Rubbing, Electrons Move From Fur To Ebonite Rod



This is because

Thus due to loss of electrons, the fur gets a **POSITIVE CHARGE**.

An ebonite rod gets an equal amount of **NEGATIVE CHARGE**.

# ELECTRON TRANSFER – REASON FOR FRICTIONAL ELECTRICITY

The electron transfer due to friction is called

The body which possesses electric charge is called **CHARGED BODY**.

On rubbing the two bodies,

Due to friction there

From glass  
rod to silk



From fur  
to ebonite rod



# **SOME NATURAL PHENOMENA - Lightning**

- **Interaction of Charges**

# STATIC CHARGES

The electrical charges which cannot move are called **STATIC CHARGES**.

This is also called **STATIC ELECTRICITY**. These charges cannot move.

Can the charges flow through the air ?  
**NO**

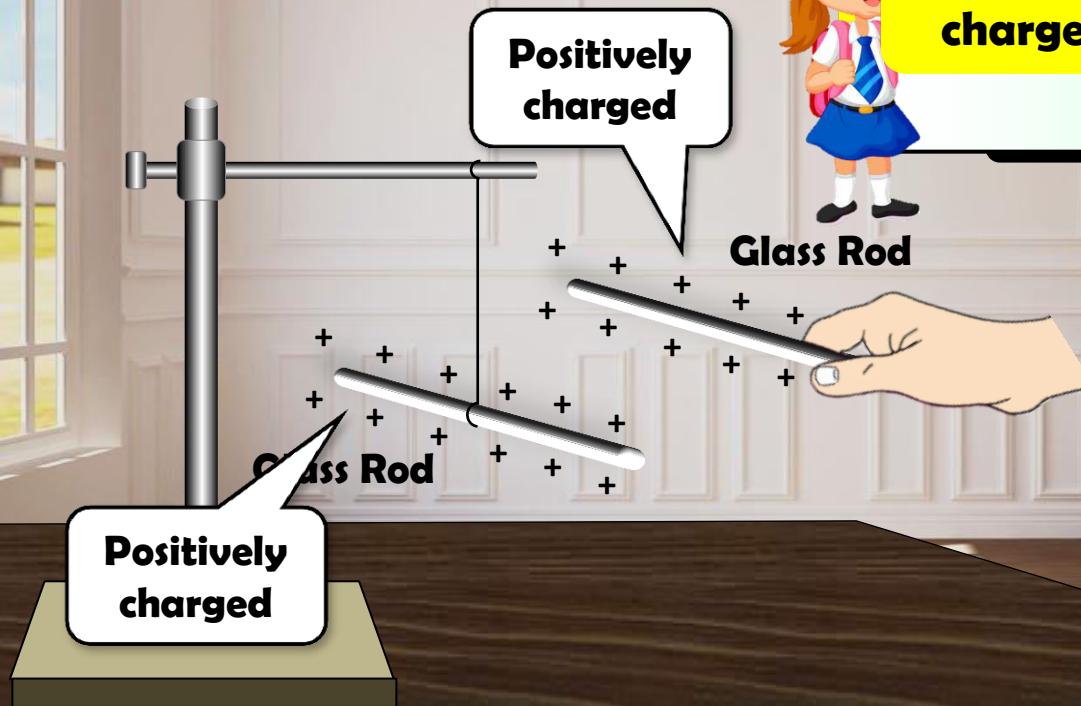


Air is a poor conductor of charges.

Can the charges flow through the straw?  
**NO**

## TWO CHARGED GLASS RODS REPEL EACH OTHER

LIKE CHARGES REPEL EACH OTHER

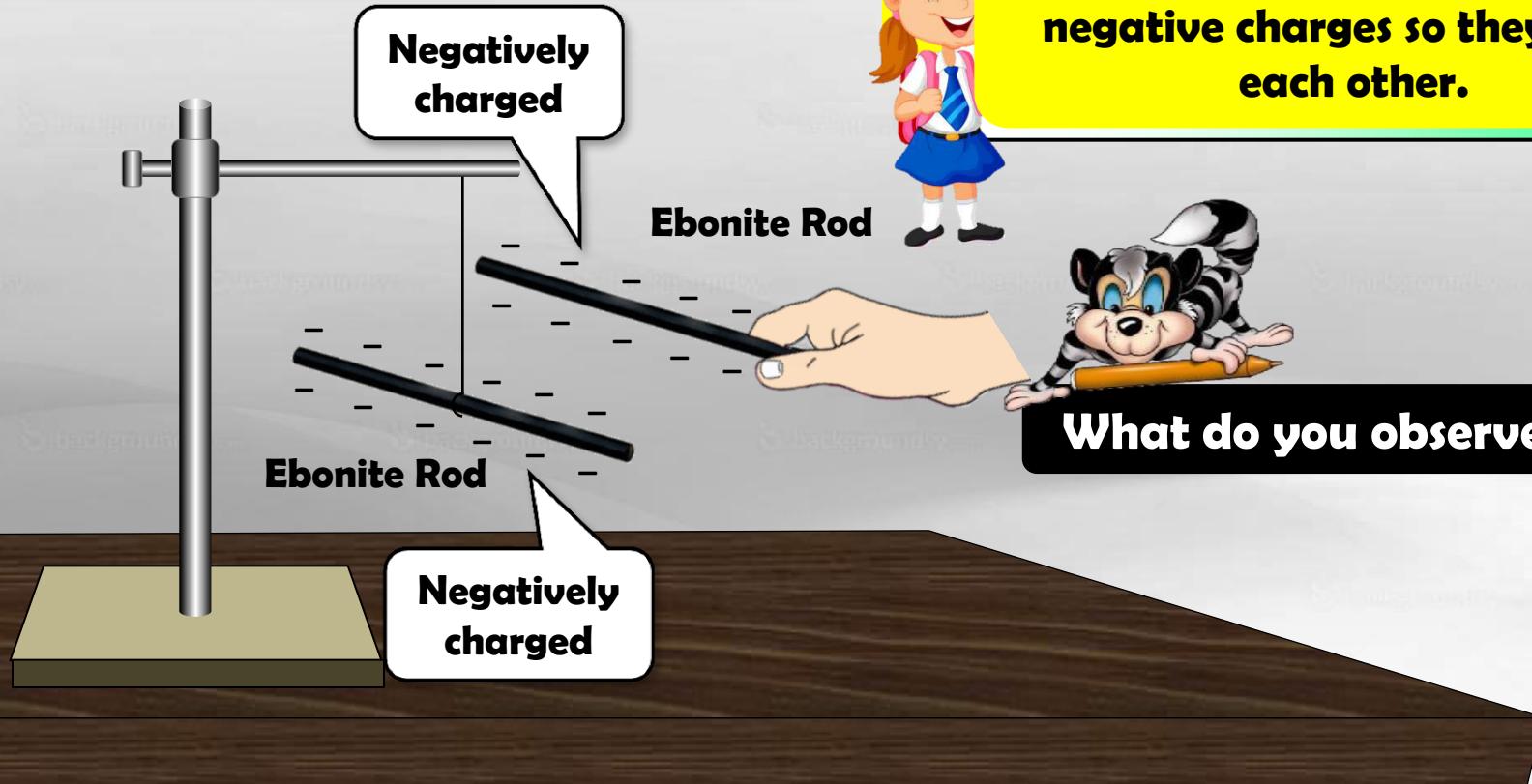


Both the glass rods are positively charged, they repel each other.

second glass rod.

## TWO CHARGED EBONITE RODS REPEL EACH OTHER

LIKE CHARGES REPEL EACH OTHER

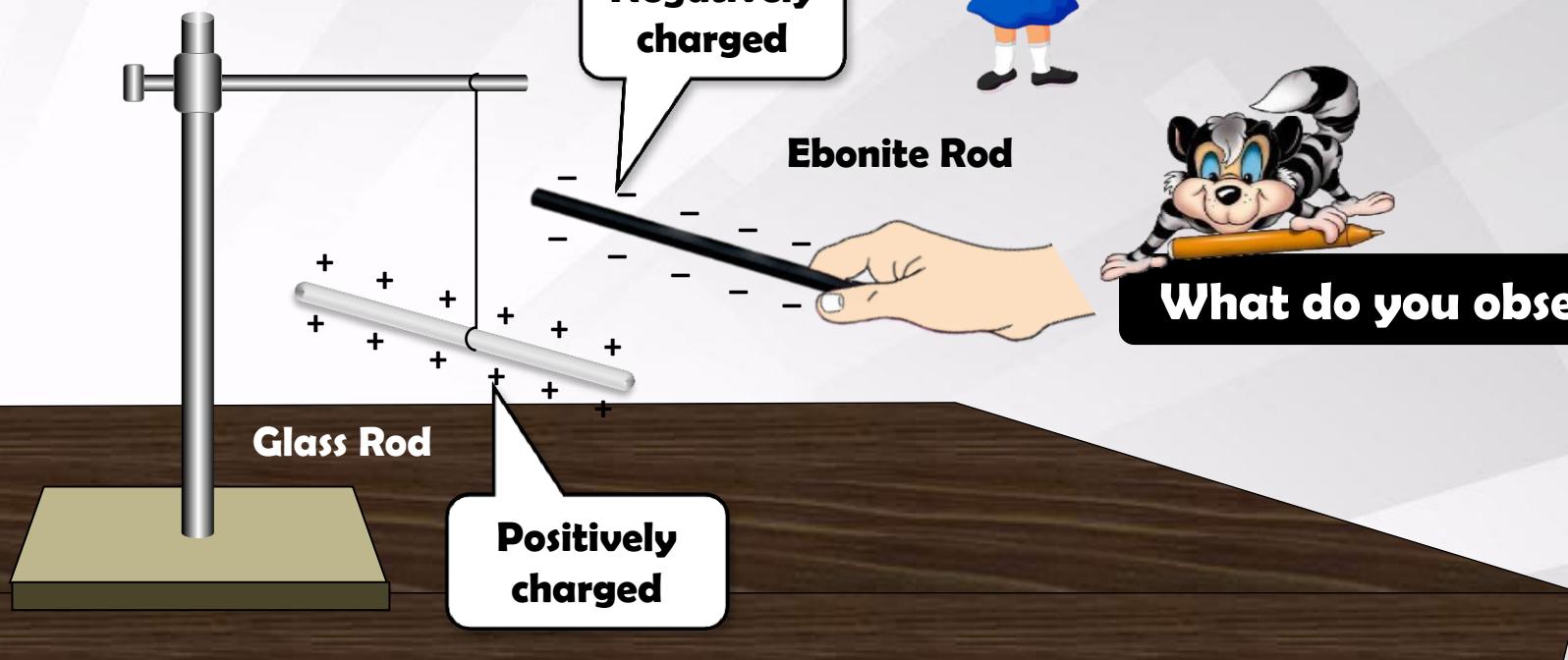


Both the ebonite rods have negative charges so they repel each other.

What do you observe ?

# A CHARGED EBONITE ROD ATTRACTS A CHARGED GLASS ROD

**UNLIKE CHARGES ATTRACT EACH OTHER**

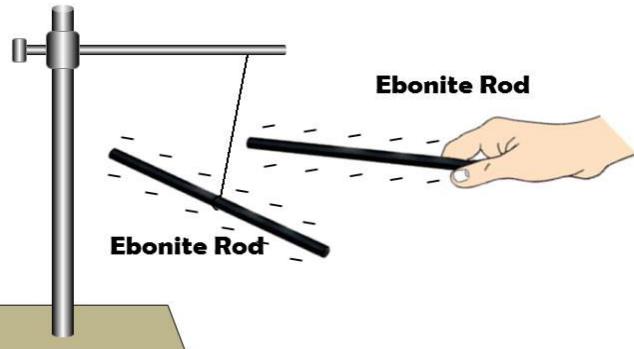


We observe that ebonite rod moves or tends to move towards the suspended rod.

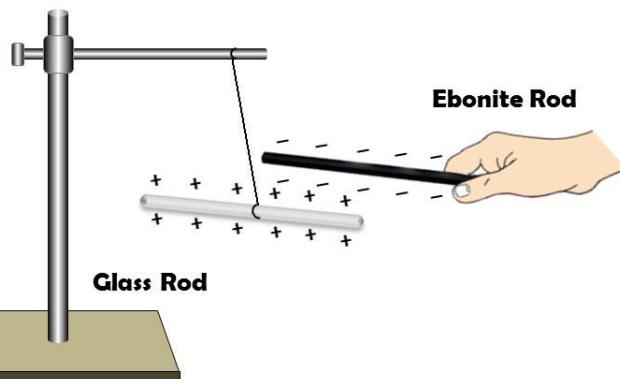


**What do you observe ?**

# LAWS OF ELECTROSTATIC ATTRACTION AND REPULSION



Two like charges  
repel each other



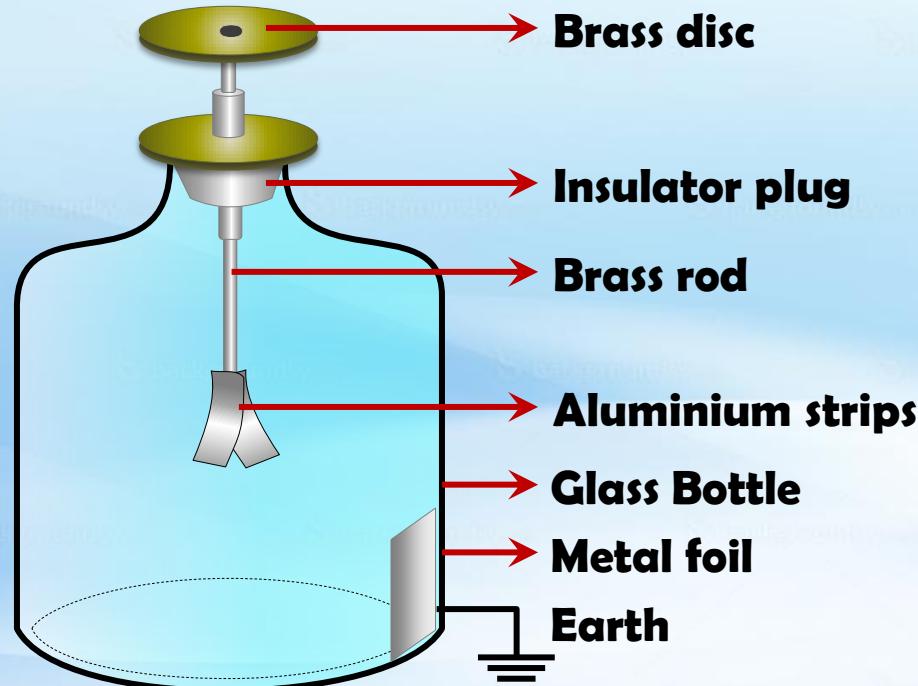
Two unlike charges  
attract each other

# **SOME NATURAL PHENOMENA - Lightning**

- **Electroscope**
- **Earthing**

# ELECTROSCOPE

A electroscope can be used for detection of even the feeble (or weak) charges.



# ELECTROSCOPE

## Detection of presence of charge

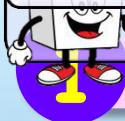
The presence of charge on a body is detected with an uncharged electroscope in the following way :

1

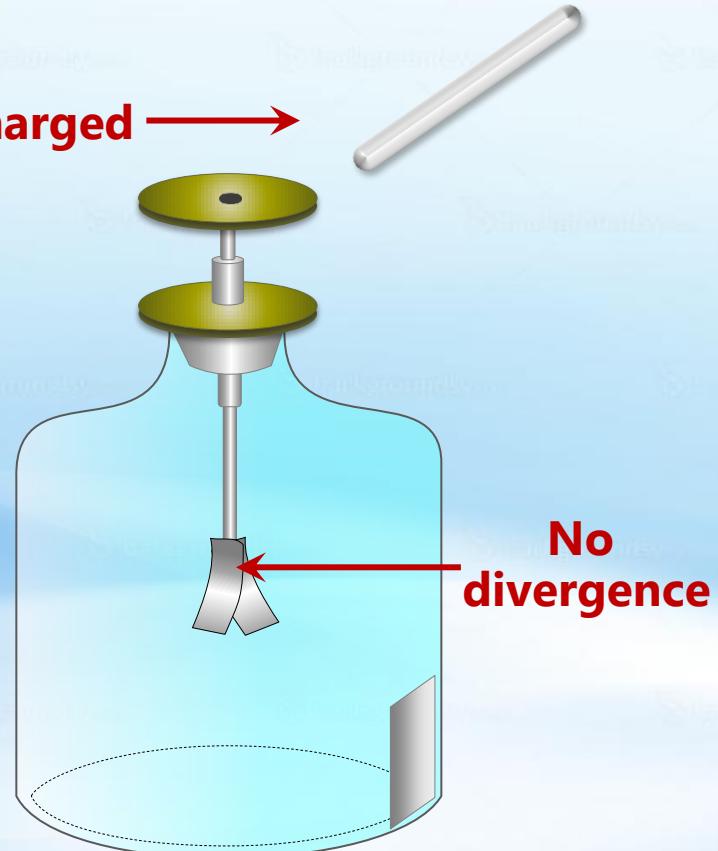
By touching the body to the brass disc.

# ELECTROSCOPE

Following two cases can arise observed he  
or an uncharged electroscope  
If there is no effect on leaves,  
the body is uncharged



Uncharged →



# ELECTROSCOPE

1

By touching the body to the brass disc.

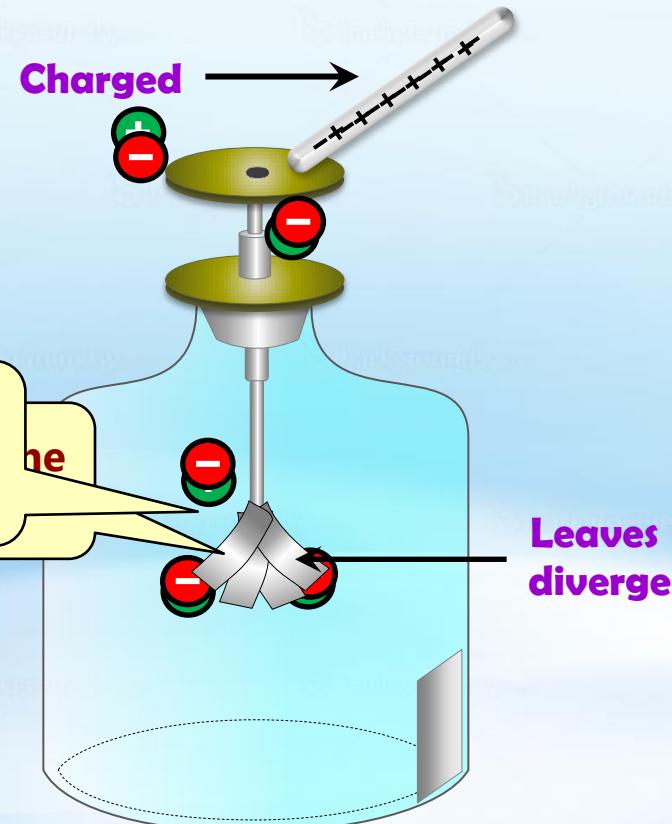


Case - II

If leaves diverge

But if charge on the body would have been negative, charge on brass disc, rod and leaves of electroscope would also

Leaves will still diverge due to repulsion between the like charges.



# ELECTROSCOPE

1

By touching the body to the brass disc.



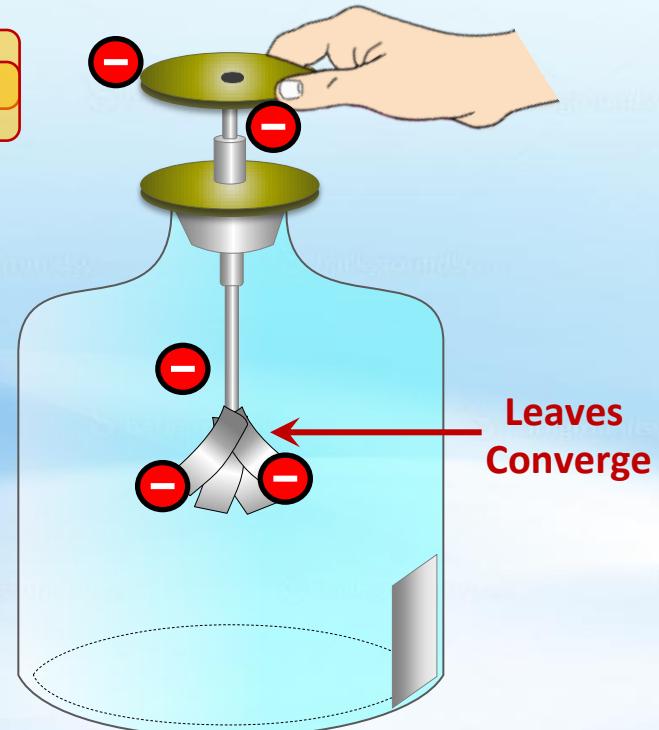
Touch the end of the lid  
Strips are discharged

why do you  
move ???

Why does this  
happen ???

The strips come back to  
their original state.

Foil strips lose their charge  
through our body.



## EARTHING :

**The process of transferring of charge from a charged object to earth.**



**Consider this to be a charged body.**

**When a person touches a charged body.**

**Charges flow from the charged object to the earth.**

# **SOME NATURAL PHENOMENA - Lightning**

- **Lightning**
- **Lightning conductor**

# LIGHTNING

CLOUD

Water droplets move downward

Electric discharge between cloud and earth or cloud and cloud is called as LIGHTNING.

AIR

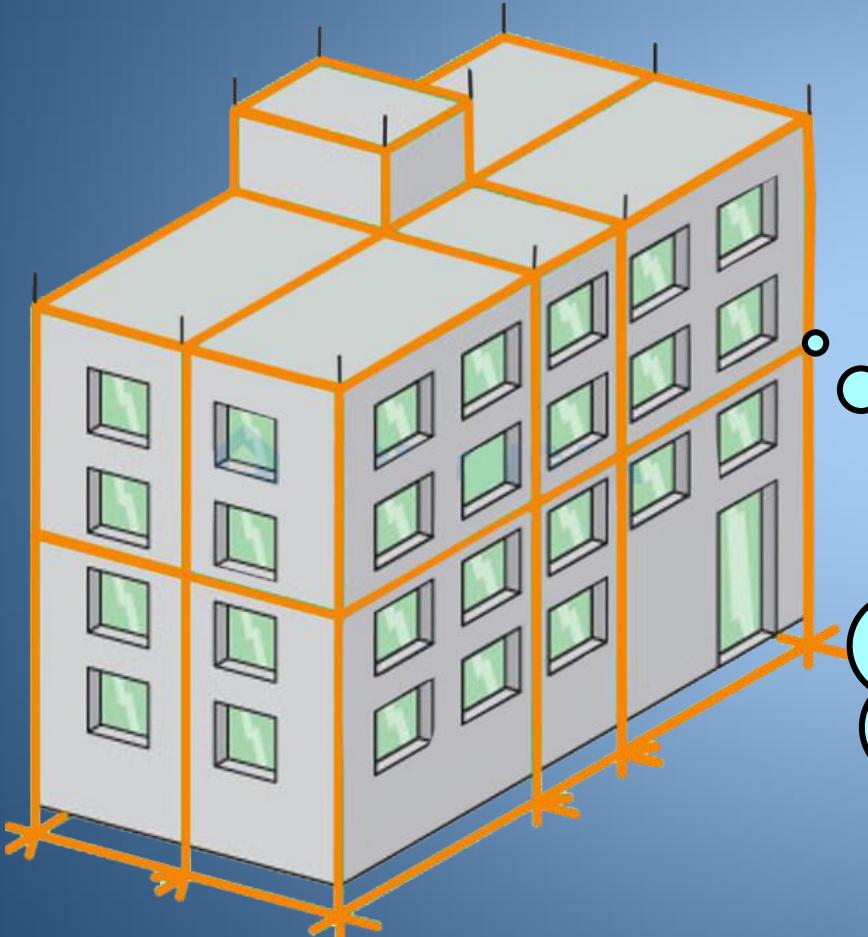
Positive charges collect near the ground.

EARTH

## A LIGHTNING CONDUCTOR



**A The other end of this strip is buried  
shape directly in the ground...**



This serves a better lightning conductor and ensures more safety of the building.

Their foundation is sunk deep into the ground.

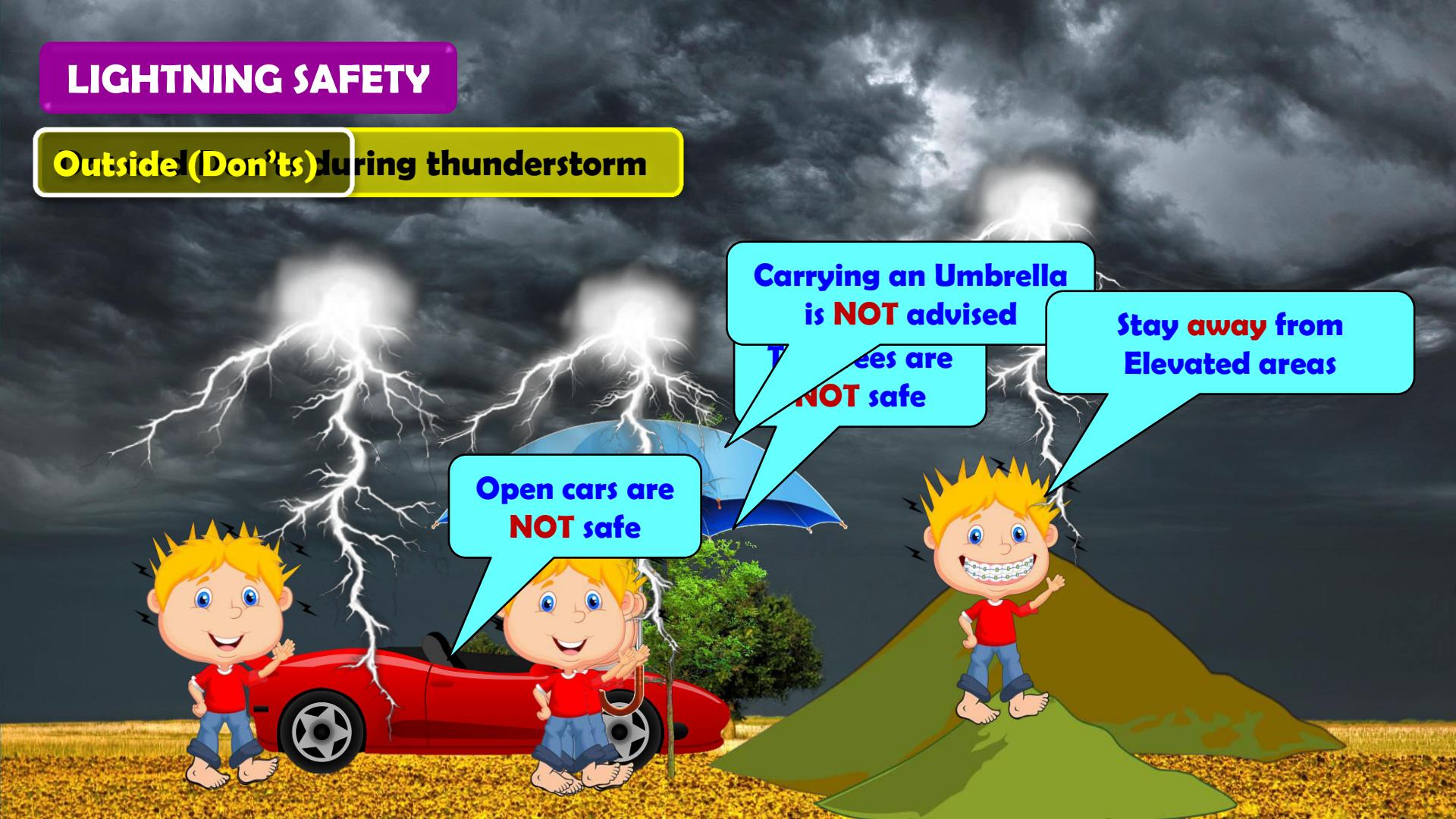
The red lines shows the network of copper strip.

# **SOME NATURAL PHENOMENA - Lightning**

- **Lightning safety**

# LIGHTNING SAFETY

## **Outside! (Don'ts) during thunderstorm**



# LIGHTNING SAFETY

## Outside (Do's)

**Squat low on the ground.**

**Place your hands on your knees.**

**Head between the hands.**

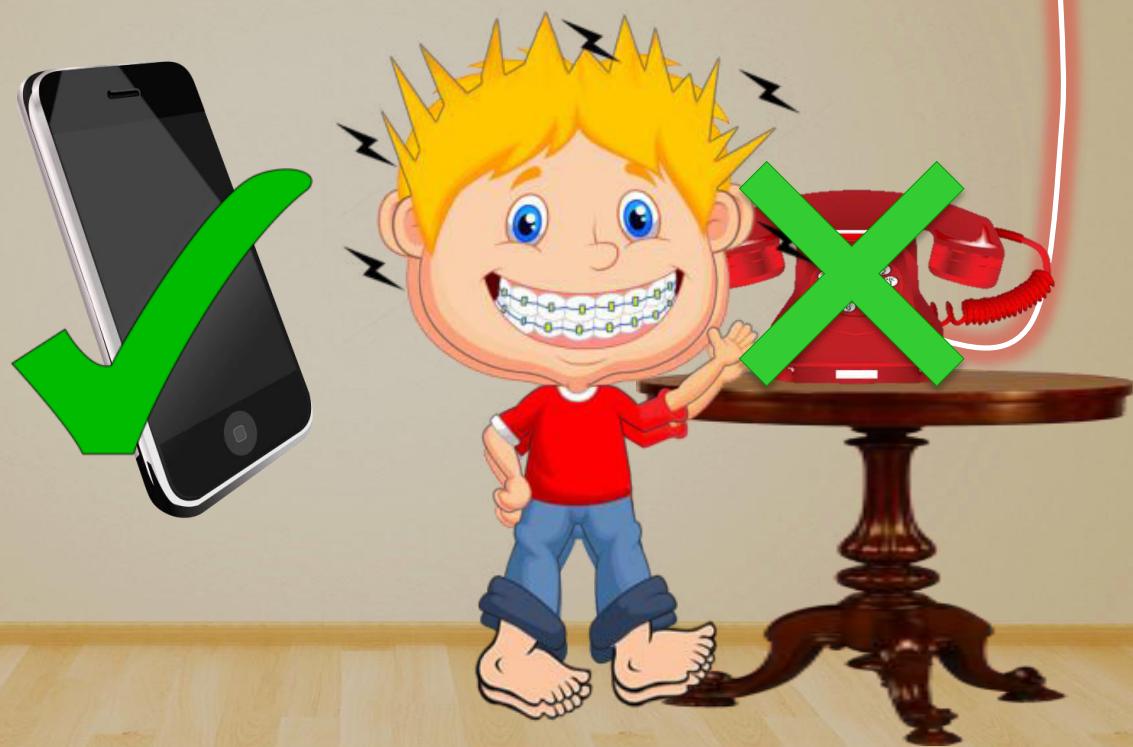
**This position will make you the  
smallest target.**



# LIGHTNING SAFETY

Inside the house

Lightning can strike  
telephone cords



# LIGHTNING SAFETY

Inside the house

Lightning can strike  
electrical wires

Electrical appliances like  
computers, TVs etc. should  
be unplugged



# LIGHTNING SAFETY

Inside the house

Contact with running water must be avoided during thunderstorms

Lightning can strike metal pipes

# Thank You