

## Introduction

- There are some destructive natural phenomena like storms, cyclones, earthquakes and lightning.
- Human life and property get badly affected by these natural phenomena.
- But with time we evolved to protect our life from these types of destructions.

## Lightning

- Sometimes we observe sparks when the plug is loose, the same type of sparks we can see on the electric poles when the wires are loose. These electric sparks on large scale are known as lightning.
- When charges accumulate in the clouds, they cause lightning.
- These sparks can be very dangerous we should take precautions during lightning.

## The sparks that the Greeks knew about

- The ancient Greeks knew that on rubbing amber with fur it can attract small things.
- We can also observe that our hair stands on end and sometimes we also hear crackling sound and may see sparking when we take off our clothes.
- In 1752, an American scientist lightning is same as the spark from our clothes.

## Charging by rubbing

### ➤ Activity 1

1. Take a discarded refill of ball pen.
2. Now start rubbing it vigorously with a piece of polythene.
3. Now bring this refill to small piece of paper holding it from another end.
4. You will notice that the refill attracts the paper.

[caution: do not touch the rubbed part of these object with your hand or any metallic object]

- The refill acquires small amount of electric charge that is why it attracts the piece of paper.
- In this process the polythene will also get charged.
- These electrically charged bodies are known as charged objects.

## Types of charges and their interaction

### ➤ Activity 2

1. Rub two balloons with a woolen cloth and hang them on wall.
2. You will notice that balloons will repel each other

3. Now take two refills of used pens and rub them with a piece of polythene.
  4. Put these charged pens in a glass tumbler.
  5. You will notice that pens will repel each other.
  6. Now bring a charged balloon near the charged pen.
  7. Now you will observe that the balloon and the pen attract each other.
- The above activities shows that two like charged objects repel each other while two unlike charged objects attract each other.
  - This indicate that the two different objects have different type of charges. If one has positive charges then other would have negative charges.
  - Thus, we can conclude that same types of charges repel each other while two different types of charges attract each other.
  - The charges that generate on rubbing any object they do not move by themselves that means they are static in nature.
  - Flowing charges produce electricity.

### Transfer of charge

- Electroscope is a device used to test whether an object is charged or not.
- Electrical charge can be transferred through the metal conductor from one charged body to another charged body.
- When the charge from a charged body is transferred to the earth this process is known as earthing. Through earthing a charge body gets discharged.
- Any leakage of electric current in our building can give us electric shocks to protect us from these electric shocks or building is provided with earthing.

### The story of lightning

- During the development of thunderstorm, the charges separate because of the movement of air current in upward directions and water droplets move in downward directions.
- Positive and negative charges accumulate on opposite sides of cloud.
- In the upper edge of the cloud positive charges accumulate and in the lower edge of the cloud negative charges accumulate.
- Near the ground also positive charge accumulate and hence it attracts the negative charge accumulated near the lower edge of the cloud.
- In this case air become the conductor because it can not control the heavy attraction and hence the negative charges of the cloud meet the positive ground of the earth.
- This meeting of charges produces streaks of bright light and sound and these streaks are known as lightning.
- This process of meeting the negative and positive charge and producing lightning is known as electric discharge.

- The lightning can be within two or more clouds and can between clouds and earth.
- Lightning is the destructive natural phenomena.

## Lightning safety

- Open place is not the safe place during lightning and thunderstorm.
- One should wait for some time inside the houses or in some vehicles but not in open vehicles
- If you are in open places such as field or in some open vehicles try to find a shelter.
- If no shelter is there nearby then stand under a short tree.
- Tall trees, elevated places can be very dangerous during lightning.

## Inside the house

- Contact with telephone cords, electric wire is not safe because lightning is the electrical discharge and can strike these items.
- One should not bath during thunderstorm as it is not advisable to make contacts with running water.
- Some electric appliances like computers, TVs etc., should not be plugged in.
- Electrical lights do not cause any harm so they can be turned on.

## Lightning conductors

- In the walls of our house a metallic rod is installed which is taller in length whose one end remains in the air and other end lies in the ground.
- This metallic rod is known as the lightning conductors which protect us from the effect of lightning by providing the route for the electric charge to get transferred into the ground.
- Water pipes, electric wires and the metal columns is installed during the constructions of buildings these things also protect us to some extent.

## Earthquakes

- Earthquake is another natural destructive phenomenon which can cause a massive destruction to human life and property.
- Still, we are not able to predict an earthquake.
- Some of the major earthquakes that we have witnessed in India are in Bhuj district of Gujrat on 26 January 2001 and in Uri and Tangdhar towns of north Kashmir on 8 October 2005.

## What is an earthquake?

- A sudden shake or a tremble of the earth because of the disturbance in the earth's crust is known as the earthquake.

- Minor earthquakes which occur almost all the time, all over the earth but not even noticed.
- Major earthquakes cause great loss to life and properties. And they are not very frequent.
- Floods, landslides, and tsunamis are caused by earthquakes.

### What causes an earthquake?

- The outermost layer of the earth is in pieces known as fragments and each fragment are known as plate.
- These plates are not static they are in motion when these plates collide with each other either they will brush past each other or will go under another this cause disturbance in the earth's crust which causes earthquakes
- An underground nuclear explosion, volcano eruption or when a meteor hits the earth these all can be the reason of earthquakes.
- Still, movement of earth's plates cause most of the earthquakes.
- Fault zones or seismic zones are the weak zones are the boundaries of the plates where earthquakes are likely to happen the most.
- In India the danger zones are Kashmir, western and central Himalayas, Rann of Kutch Rajasthan, whole of north- east, Indo-Gangetic plane and some parts of South India.
- The device that measures the magnitude of an earthquake is called Richter scale.
- The magnitude more than 7 of an earthquake causes massive destruction.
- The waves produce on the earth surfaces because of the tremors are called seismic waves.
- The instrument that records these waves is called seismograph.
- Seismograph is simple instrument of vibrating rod or a pendulum that starts to vibrate when tremors occur.
- A pen attached to this instrument records the seismic waves on a paper which moves under it.
- Richter scale is not linear that means a little increase in the scale can cause 1000 times more destructions.

### Protection against earthquakes

- As we know that earthquakes can not be predicted but we take precautions to protect ourselves and our property from earthquakes
- Seismic zones are the places of high risk so people of those places should take proper measures.
- Buildings in such places should be well designed so that it can withstand any tremors.
- The structure of our house should be "quake safe".

- Mud or timber should be used for the heavy construction so that in case of earth quake so that damage is not very big.
- Cupboards and shelves should be fixed so that do not fall during earthquakes.
- Buildings can catch fire so it must have fire free equipment in good working condition.
  1. **If you are at home**
    - Stay away from all heavy items that may fall.
    - Try to get under any table or bed.
  2. **If you are outdoors**
    - Do not stand near any building, trees, and overhead powers.
    - If you are in a car or in a bus try to stay in it and move slowly to find a clear spot.

