SOME NATURAL PHENOMENA

In the earlier classes you have learnt about winds, storms and cyclones.

You have learnt that cyclones can cause a lot of damage to life and property. You also learnt that we can protect ourselves from these destructive phenomena to some extent.

In the present chapter, we shall discuss two other natural phenomena that cause destruction. These are lightning and earthquake. We shall also discuss what steps we can take to reduce the destruction caused by these phenomena.

Lightning

You might have seen sparks on an electric pole when wires become loose or when wind blows and shakes the wires. You might also have seen sparks when a plug is loosely put in its socket and the switch is put on. *(Do not try this if you have never seen such a spark.)*

Lightning is also an electric spark, but on a huge scale. In ancient times people did not understand the cause of these sparks.

They were, therefore, afraid of lightning and thought that the wrath of gods or evil spirits was striking them. Now, of course, to some extent we understand reasons for lightning.

We have to take some precautions to protect ourselves from the deadly sparks of lightning.

The Sparks that the Greeks Knew About !

The ancient Greeks knew, as early as in 600 B.C. that when amber (amber is a kind of resin) was rubbed with fur, it attracted light objects such as hair.

You might have seen that when you take off woollen or polyester clothes, especially in dry season the hair on your skin stands on end.

If you take off these clothes in the dark, you even see a spark and hear crackling sound.

⇝ Why does hair get attracted towards clothes?

In 1752, Benjamin Franklin, an American scientist, showed that lightning and the spark from your clothes are essentially the same phenomena.

People before Franklin knew about the phenomena of lightning and hair getting attracted to clothes but did not have an idea that these are related. However, to realise that these two are the same phenomena but at different scales, it took about 2000 years.

Scientific discoveries are a result of hard work by many people. It can sometimes take a long time.

We shall now study some properties of electric charges. We shall also see how they are related to the lightning in the sky.

Let us perform some activities to understand the nature of electric charges. Let us recall what you might have played as a game.

When you rub a plastic scale on your dry hair, the scale can attract very small pieces of paper.

⇝ Why is the plastic scale not able to attract pieces of paper before it gets rubbed by dry hair?

Charging by rubbing

Activity-1

Effect of rubbing

Take a used ball-pen refill and bring it near small pieces of paper. The refill should be close enough but not touch the pieces of paper.

Check what happens to the paper-pieces. Now, rub the refill vigorously with a piece of polythene.

Bring it close to small pieces of paper. Note your observation. Take care that the rubbed end is not touched by your hand or with a metallic object.

Now, take a comb and move it through dry hair a few times. Take the comb near small pieces of paper and check what happens.

Fig-1

Take an inflated balloon and rub it against your clothes. Bring the balloon close to small pieces of paper.

Take a drinking-straw and rub it against a smooth wall or against your clothes, then bring it near pieces of paper.

- What do you observe?
- Are they able to attract bits of paper after being rubbed?

Repeat the activity by rubbing each one of the above mentioned objects (refill, comb, drinking straw, balloon) and use small pieces of dry leaf, husk, etc as testing materials. Record your observations in table-1.

- What can we infer from the above activity?
- Do the objects like refill or comb attract pieces of paper only after rubbing?
- Do all objects show this property?
- Can we rub a comb against our palm and make it attract the paper bits? Try it and see.

Table-1

Object	Material used for testing	Effect before rubbing	Effect after rubbing
Refill	Pieces of Paper	Paper-pieces remain stationary	Pieces get attracted to the refill
	Pieces of dry leaves		
	Husk		
Comb	Pieces of Paper		

	Pieces of dry leaves	
	Husk	
Balloon	Pieces of	Paper
	Pieces of dry leaves	
	Husk	
Drinking	Pieces of	Paper
Straw	Pieces of dry	leaves
	Husk	

Let us try to find out whether all objects show this property. We will also try to find out whether attracting paper-pieces is only due to rubbing or rubbing with specific materials.

When a plastic refill is rubbed with polythene, it acquires a small electric charge. Similarly, when a plastic comb is rubbed with dry hair, it acquires a small charge.

These objects are called charged objects. In the presence of a charged refill or plastic comb, bits of paper and hair also get charged. Let's try to charge some other objects that are familiar to you.

Lab Activity

Aim: To find effects of charged bodies which have been rubbed by different materials.

Material required: A ball pen refill, a balloon, a comb, an eraser, a steel spoon, polythene sheet, plain paper, woollen cloth, etc.

Procedure :

Rub the above objects against materials listed in table-2. In each case, bring the rubbed object near small pieces of paper and note whether they attract pieces of paper or not. Record your observations in table-2 by writing 'yes' or 'no'.

Table-2

Object	Material used for rubbing	Whether paper pieces are attracted?
Refill	Plain Paper	
	Polythene sheet	yes
	Woolllen cloth	
	Dry hair	
Inflated Ballon	Polythene sheet	

	Woolllen	cloth
	Plain Paper	
	Polythene sheet	
Comb	Woolllen cloth	
	Dry hair	
	Polythene sheet	
Eraser	Woolllen	cloth
	Plain	Paper
	Polythene	sheet
Steel spoon	Woolllen cloth	

↛ What do you conclude from the above table?

Some objects like refill, comb, etc when rubbed with some specific materials are able to attract light objects like bits of paper. But some objects like steel spoon do not attract pieces of paper even after rubbing.

↛ Why do not some materials attract pieces of paper even after rubbing?

Let us try to explore this phenomenon further.

Types of charges and their interaction

Activity-2

Understanding types of charges

Fig-2(a)

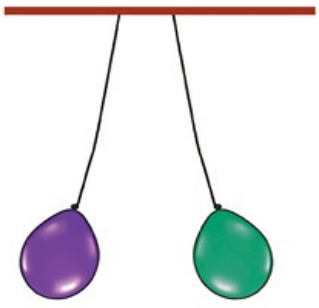


Fig-2(b)

Inflate two balloons and hang them in such a way that they do not touch each other. Rub both the balloons with a woollen cloth and release them.

(Make sure that your hand doesn't touch the balloon while rubbing with woollen cloth).

↛ What do you observe?

Take a refill and rub it with a polythene sheet. Keep it gently in a plastic tumbler. Take another refill and also rub it with the same polythene sheet.

Bring the second refill near the first one in the tumbler. Take care that you do not touch either of the rubbed portions of the refills with your hand.

- Is there any effect on the first refill in the tumbler?
- Do they attract each other or repel each other?

Bring two ballons rubbed with same silk cloth together what happend ?

Now, take a rubbed balloon near the rubbed refill in the tumbler and check the action (fig-3).

Fig-3

- Do they attract each other or repel each other?

In the first and second acvitities two objects that were made of the same material have brought near to each other after being rubbed with some appropriate material.

In the third part, objects made of different materials were brought near to each other after being rubbed with different material.

Let us summarise our observations carefully.

1. A balloon rubbed with woollen cloth repelled another balloon of the same type.
2. A refill rubbed with polythene repelled another refill rubbed with similar material.
3. A ballon rubbed with woollen cloth attracted by a refill rubbed with polythene sheet.

- What can we conclude from these observations?
- Does the repulsion between charged balloons indicate that they posses similar charge?
- Does the attraction between a charged balloon and a charged refill indicate that they posses different charges?
- Does this activity remind you some of experiments that you have done in 'Playing with Magnets' chapter of class VI?

We know that magnets attract objects made up of magnetic materials like Iron, Nickel, Cobalt, etc.

We also know that unlike poles of magnets (North-South or South-North) attract each other and like poles (North-North or South-South) repel each other.

- Can we say that something similar is happening in above activities?
- Does it indicate that the charge on the balloon is of a different kind from the charge on the refill!
- Can we say that there exist two kinds of charges?
- Can we also say that the charges of the same kind repel each other, while charges of different kinds attract each other?

It is a convention to call the charge acquired by a glass rod when it is rubbed with silk cloth positive and the charge aquired by the silk cloth is negative.

It is observed that when a charged glass rod is brought near to a charged plastic straw which is rubbed with polythene sheet, there is attraction between the two.

- What do you think about the kind of charge on the plastic straw?

You may guess that the plastic straw would carry a negative charge.

- Is your guess correct or wrong? Discuss with your teacher.

The electrical charges generated by rubbing are static. They do not move by themselves.

When charges move, they constitute an electric current. You studied about the current in a circuit which makes a bulb glow, or the current that makes a wire get heated in class VI & VII.

The electric current in a circuit represents motion of charges.

Activity-3

To find the presence of charge on a body

Make a small ball of thermocol. Collect thin silver foil used to decorate sweets. Wrap this thin silver foil to cover the thermocol ball and suspend it from a stand with the help of a thread as shown in the figure 4.

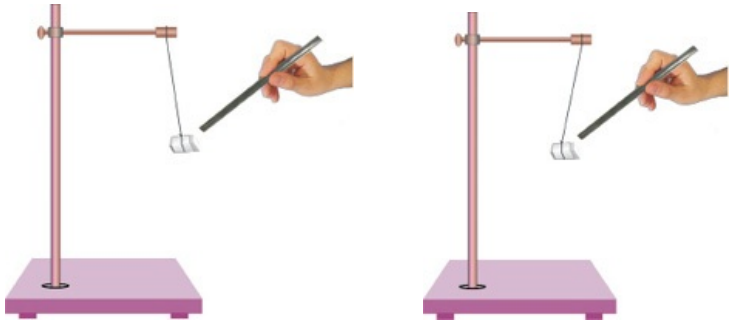


Fig-4: Testing the presence of charge

Bring a glass rod which is rubbed with a silk cloth near the suspended ball. What happens? Does it get attracted towards the glass rod or move away from it.

Now touch the silver foil on the thermocol ball with charged glass rod. Remove the glass rod from the ball and again rub it with silk cloth and bring it close to the suspended ball.

- What do you observe?
- Does it get attracted towards the glass rod or move away from it?

You may notice in the first instance that the thermocol ball is attracted towards the glass rod and in second instance it moves away from the glass rod.

- What could be the reason for this change in movement of the ball?

If a charged body is brought near an uncharged body it induces an opposite charge on it and it gets attracted by the body.

In the above experiment when a charged body (glass rod rubbed with silk cloth) is brought near an uncharged body (thermocol) it induces an opposite charge in it and hence it get attracted by the glass rod.

In second case (above experiment) we have charged the thermocol ball by touching it with a charged glass rod. Hence when we brought the glass rod near the ball, as both of them have similar charge the ball gets repelled by the glass rod.

From the above experiment we can conclude that attraction is not a sure test to know the presence of a charge on a body.

Activity-4

Demonstrating transfer of charge

Take an empty jam bottle. Take a piece of cardboard slightly bigger in size than the mouth of the bottle.

Pierce a hole in it so that a metal paper clip could be inserted. Open out paper clip as shown in the fig-5

Fig-5

Cut two strips of aluminium foil about 4 cm×1 cm each and hang them on the paper clip.

Insert the paper clip having the strips of aluminium foil in to the cardboard lid so that it is perpendicular to it as shown in the fig-5.

Charge a refill and make it touch the end of the paper clip. Observe what happens.

- Is there any effect on the strips of aluminium foil?
- Do they repel each other or attract each other?
- Now bring other charged bodies and make them touch the end of the paper clip.
- Do the foil strips behave in the same way in all cases?
- Can this apparatus be used to detect the presence of charge on a body or not?
- Can you explain why the strips repel each other?

The strips of aluminium foil receive the same charge from the charged refill through the paper clip. The strips carrying similar charges repel each other and hence they move apart.

This device can be used to test whether an object is carrying charge or not. This device is known as electroscope. (Earlier days gold foil used in electroscope). In the above activity you can observe that electrical charge can be transferred from a charged object to another through a metal conductor.

Touch the end of the paper clip gently with hand and you will find a change in the foil strips. They move closer and come back to their original state.

Repeat charging of foil strips and touching the paper clip. Every time you will find that the foil strips collapse as soon as you touch the paperclip with hand.

- Why does it happen?

The reason is that the foil strips lose charge to the earth through your body. We say that the foil strips are discharged.

The process of transferring of charge from a charged object to the earth is called **"earthing"**.

Earthing is provided in buildings to protect us from electrical shocks due to any leakage of electrical charge.

The Story of Lightning

Fig-6

It is now possible to explain lightning in terms of the charges produced by rubbing. You have learnt in Class VII that during the development of a thunderstorm there will be fast movement of air currents.

The clouds moving in air acquire a charge on their surface due to the friction with particles of air. As the surface area of a cloud is very large, the amount of charge accumulated on its surface is very high.

When a charged cloud comes close to another cloud it induces an opposite charge on the later and the accumulated charge tries to move from one cloud to another cloud.

But the air present between them being a poor conductor of electricity resists the flow of charge between them.

When the magnitude of the accumulated charge becomes very large, the air, which is normally a poor conductor of electricity, is no longer able to resist their flow.

Hence discharge takes place between negative and positive charges which produce streaks of bright light and sound. We see streaks as lightning. The process is called an electric discharge.

The process of electric discharge can occur between two or more clouds, or between clouds and the earth. Today we need not get frightened by lightning like the ancient people did. Now we understand the phenomenon.

Scientists are trying hard to improve our understanding. However, lightning strike could destroy life and property. It is, therefore, necessary to take measures to protect ourselves.

Lightning Safety

1. Which is the safe place during a thunder storm?

- A house or a building of low height
- If you are travelling in a bus or in a car you are safe inside provided that doors and windows are closed.
- If you are in a forest, taking shelter under shorter trees than a taller tree is a good idea during the thunder storm.

2. Which is not a safe place during a thunder storm?

- Travelling in an open place.
- Standing under tall trees in open fields or in a garden / park.
- Staying in multi storied building which do not have lightning conductors.
- Standing near electric poles or telephone poles.
- Speaking on landline telephones.
- Using electric appliances like T.V and Computers.

Lightning Conductors

Lightning Conductor is a device used to protect buildings from the effect of lightning. A metallic rod, taller than the building, is installed in the walls of the building during its construction.

One end of the rod is kept out in the air and the other is buried deep in the ground as shown in fig-7. The rod provides an easy route for the transfer of electric charge to the ground.

The projected end of the metal rod is at a height more than the height of the building. Hence it receives the charge first during lightning because it is closer to the cloud than the building.

As it is a good conductor of electricity, it allows all the charge to flow through it thereby causing no damage to the building.

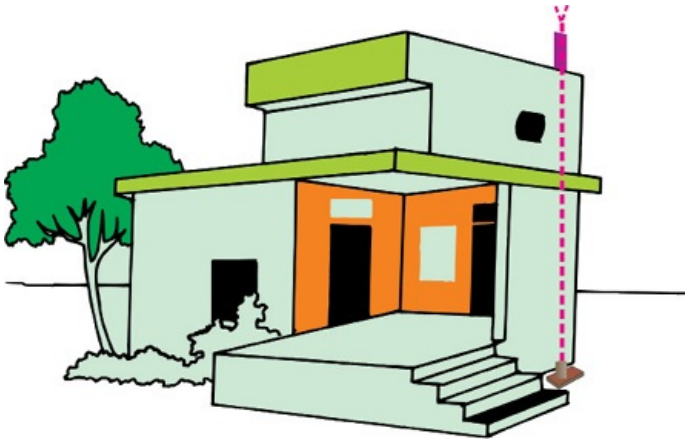


Fig-7

The metal columns used during construction and water pipes in the buildings also protect us to some extent. But do not touch them during a thunderstorm.

Earthquakes

Natural phenomena like lightning, floods, cyclones etc., can cause large scale destruction of human life and property. Fortunately, these phenomena can be predicted to some extent.

The metrological department can warn about a thunderstorm developing in some area. If a thunderstorm occurs there is always a possibility of lightning and cyclones accompanying it.

So, we get time to take measures to protect ourselves from the damage caused by these phenomena.

There is, however, one natural phenomenon which we are not yet able to predict. It is an earthquake. It can cause damage to human life and property on a huge scale.

A major earthquake occurred in India on 8th October 2005 in Uri and Tangdhar towns of North Kashmir. Before that a major earthquake occurred on 26th January 2001 in Bhuj District of Gujarat.

Activity-5

Collecting information about the damages caused by earth quakes

Ask your parents about the huge damages to life and property caused by these earthquakes. Collect a few pictures showing the damage caused by these earthquakes from newspapers and magazines of those days.

Prepare a short report on the suffering of the people during the earthquakes.

- What is an earthquake?
- What happens when it occurs?

↵ What can we do to minimise its effects?

These are some of the questions which we shall discuss here.

What is an Earthquake?

An earthquake is a sudden shaking or trembling of the earth lasting for a very short period of time. It is caused by a disturbance deep inside the earth's crust.

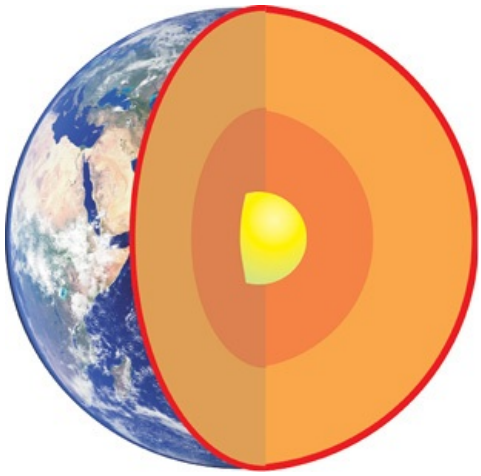


Fig-8

Some mythical/folk stories told that the earth is balanced on the horn of a bull and when the bull shifts it to the other horn, an earthquake takes place.

↵ How could it be true?

Earthquakes occur all the time, all over the earth. They are not even noticed. Major earthquakes are much less frequent. They can cause immense damage to buildings, bridges, dams and people.

There can be a great loss to life and property. The earthquakes can cause floods, landslides and tsunamis.

A major tsunami occurred in the Indian Ocean on 26th December 2004. All the coastal areas around the ocean suffered huge losses.

Activity-6

Locating the tsunami affected areas in the map

Take an outline map of the world. Locate the eastern coast and Andaman and Nicobar Islands in India. Mark other countries around the Indian Ocean which could have suffered damage.

Collect accounts of the devastation caused by the tsunami in India from your parents, or other elders in the family or in the neighbourhood.

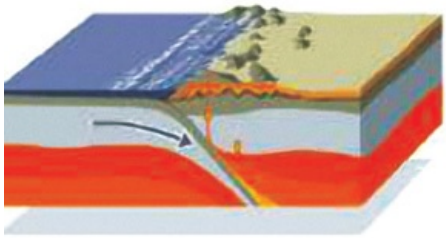
What Causes an Earthquake?

↵ What could cause a disturbance inside the earth?

In ancient times, people did not know the true cause of earthquakes. Their ideas were, therefore, expressed in mythical/folk stories. Similar myths were prevalent in other parts of the world.

Now we know that the tremors are caused due to the disturbance at deep down inside portion of uppermost layer of the earth. This uppermost layer of the earth is called crust.

The outer most layer of the earth is not in one piece. It is fragmented. Each fragment is called a plate. These plates are in continuous motion. [See fig-9(a), 9(b)]



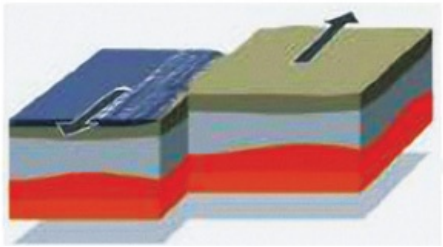


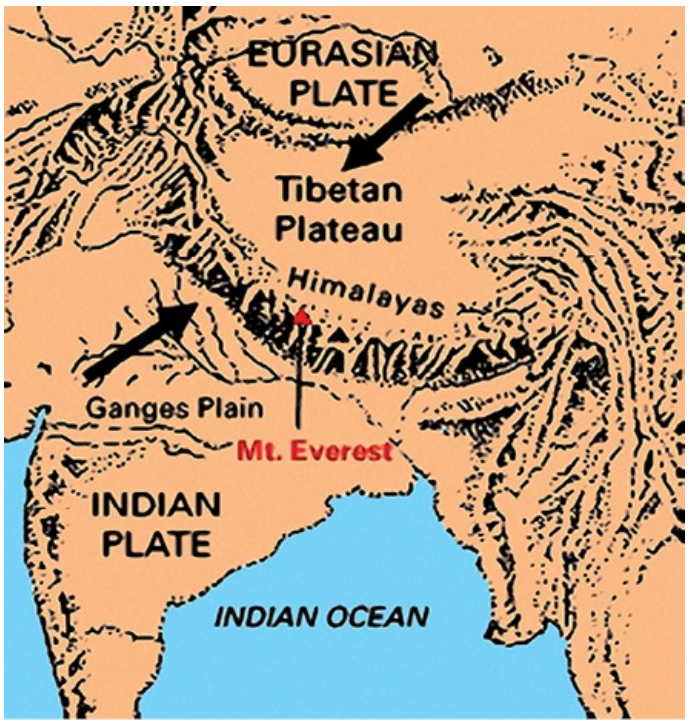
Fig-9(a) Fig-9(b)

When they brush past on one another, or a plate goes under another plate due to collision, they cause disturbance in the earth's crust.

It is this disturbance that shows up as an earthquake on the surface of the earth. However, most earthquakes are caused by the movement of earth's plates.

Since earthquakes are caused by the movement of plates, the places at boundaries of the plates are considered as weak zones where earthquakes are more likely to occur.

The weak zones are also known as seismic or fault zones. In India, the areas most threatened are Kashmir, Western and Central Himalayas, the whole of North-East, Rann of Kutch, Rajasthan and the Indo – Gangetic Plane. Some areas of South India also fall in the danger zone as shown in figure 10.



- Can we predict when and where the next earthquake takes place?
- How do we know the occurrence of an earthquake?

Seismologists use two main devices to measure an earthquake, a seismograph and a seismoscope. The

seismograph is an instrument that measures seismic waves caused by an earthquake.

The seismoscope is an instrument that measures the occurrence or the time of occurrence of an earthquake. Unlike other measuring devices, the seismoscope is a simple device which can be used without any technological background.

⇀ How do we measure the intensity of the earthquake?

The power of an earthquake is expressed in terms of a magnitude on Richter scale. The destructive earthquakes have magnitudes higher than 7 on the Richter scale.

Both Bhuj and Kashmir earthquakes had magnitudes greater than 7.5.

Although, we know for sure what causes an earthquake, it is not yet possible to predict when and where the next earthquake might occur. Tremors on the earth can also be caused when a volcano erupts, or a meteor hits the earth, or an underground nuclear explosion takes place.

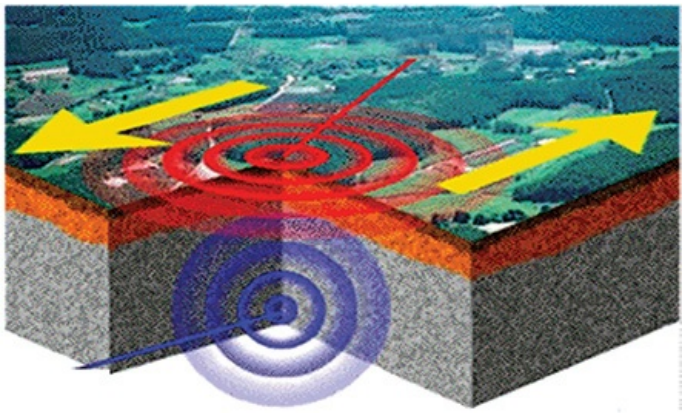


Fig-11

The tremors produce waves on the surface of the earth (see figure 11). These are called seismic waves. The waves are recorded by an instrument called the seismograph.

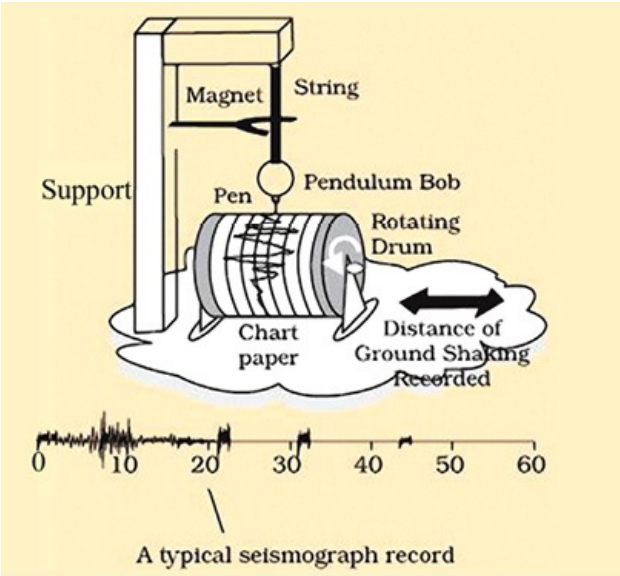


Fig-12: A typical sesmograph record

The instrument is simply a vibrating rod, or a pendulum, which starts vibrating when tremors occur. A pen (stylus) is attached to the vibrating system.

The pen (stylus) records the seismic waves on a paper which moves under it. By studying these waves, scientists can construct a complete map of the earthquake.

They can also estimate its power to cause destruction.

Like many other scales, Richter scale is not linear. This means that an earthquake of magnitude 6 does not have

one and half times the destructive energy of an earthquake of magnitude 4.

In fact, an increase of 2 in magnitude means 1000 times more destructive energy. For example, an earthquake of magnitude 6 has thousand times more destructive energy than an earthquake of magnitude 4.

There is another method of measuring the intensity of an earthquake using the moment magnitude scale which is based on the amount of displacement that occurred along a fault zone rather than the measurement of ground motion at a given point.

The moment magnitude measures energy released by the earthquake more accurately than the Richter scale. It is the only magnitude scale that adequately measures the size of large earth quakes.

Table - 3 : Richter scale reading and affects of earthquake

Richter magnitude	Earthquake effects
less than 3.5	Generally not felt, but recorded.
3.5-5.4	Often felt, but rarely causes damage.
5.5-6.0	At most slight damage to well-designed buildings. Can cause major damage to poorly constructed buildings over small regions.
6.1-6.9	Can be destructive in areas up to about 100 kilometres across where people live.
7.0-7.9	Major earthquake. Can cause serious damage over larger areas.
8 or greater	Great earthquake. Can cause serious damage in areas several hundred kilometres across.

Protection against earthquakes

We know from the earlier pages that earthquakes cannot be predicted. We have also seen that they can be highly destructive. It is, therefore, important that we take necessary precautions to protect ourselves all the time.

People living in seismic zones, where the earthquakes are more likely to occur, have to be specially prepared. First of all, the buildings in these zones should be designed so that they can with stand major tremors.

Modern building technology can make it possible. It is advisable to make the structure simple so that it is 'Quake Safe'.

- Consult qualified architects and structural engineers.
- In highly seismic areas, the use of mud or timber is better than heavy construction material. Keep roofs as light as possible. In case the structure falls, the damage will not be heavy.
- It is better if the cupboards and shelves are fixed to the walls, so that they do not fall easily.
- Be careful where you hang wall clocks, photo-frames, water heaters etc., so that in the event of an earthquake, they do not fall on people
- Since some buildings may catch fire due to an earthquake, it is necessary that all buildings, especially tall buildings, have fire fighting equipment in working order.

The Central Building Research Institute, Roorkee, has developed to make quake proof houses.

In the event that an earthquake does strike, take the following steps to protect yourself:

Inside the home

- Take shelter under a table and stay there till shaking stops.
- Stay away from tall and heavy objects that may fall on you.

Outside the home

- Find a clear spot, away from buildings, trees and over head power lines. Drop to the ground.

Fig-13

Earth quakes in Andhra Pradesh

↫ Do you know the places in Andhra Pradesh where earthquakes have occurred and its intensity?

According to seismic hazard map Andhra Pradesh lies in zones II and III. The south eastern districts of Chittoor, YSR Kadapa, Nellore and Krishna and Godavari delta region have been placed in zone III and the city of the Hyderabad lies in zone II. Discuss about zones with your teacher.

Key words

Crust, discharge, earth's plates, earthquake, electroscope, lightning, lightning conductor, negative charge, positive charge, richter scale, seismograph, Seismoscope, thunder, thunderstorm, transfer of charge, tsunami, tremor

What we have learnt?

↫ Some objects can be charged by rubbing with other objects.

↫ There are two kinds of charges — positive charge and negative charge

↫ Like charges repel and unlike charges attract each other.

↫ The electrical charges produced by rubbing are called static charges.

↫ When charges move, they constitute an electric current.

↫ An electroscope may be used to detect whether a body is charged or not.

↫ Attraction is not a sure test to know the presence of charge on a body.

↫ The process of transfer of charge from a charged object to the earth is called earthing.

- The process of electric discharge between clouds and the earth or between different clouds causes lightning.
- Lightning strike could destroy life and property.
- Lightning conductors can protect buildings from the effects of lightning.
- An earthquake is a sudden shaking or trembling of the earth.
- Earthquake is caused due to the disturbance deep inside the earth's crust.
- It is not possible to predict the occurrence of an earthquake.
- Earthquakes tend to occur at the boundaries of earth's plates. These boundaries are known as fault zones.
- Destructive energy of an earthquake is measured on the Richter scale. The earthquake measuring 7 or more on Richter scale can cause severe damage to life and property.
- We should take necessary precautions to protect ourselves from earthquakes.

 Improve your learning

1. Which of the following cannot be charged easily by friction? (AS_1)

(a) A plastic scale (b) A copper rod

(c) An inflated balloon (d) A woollen cloth.

(e) Piece of wood

2. When a glass rod is rubbed with a piece of silk cloth the rod (AS_1)

(a) and the cloth both acquire positive charge.

(b) becomes positively charged while the cloth has a negative charge.

(c) and the cloth both acquire negative charge.

(d) becomes negatively charged while the cloth has a positive charge.

3. Identify True or False sentences among the following: (AS_1)

(a) Like charges attract each other (T/F)

(b) A charged glass rod attract a charged plastic straw (T/F)

(c) Lightning conductor cannot protect a building from lightning (T/F)

(d) Earthquakes can be predicted in advance (T/F)

4. Sometimes, a crackling sound is heard while taking off sweater during winter. Explain. (AS_1)

5. Explain why a charged body loses its charge if we touch it with our hand. (AS_1)

6. Name the scale on which the destructive energy of an earthquake is measured. An earthquake measures 3 on this scale. Would it be recorded by a seismograph? Is it likely to cause much damage? (AS_1)

7. Suggest three measures to protect ourselves from lightning. (AS_1)

8. Explain why a charged balloon is repelled by another charged balloon whereas an uncharged balloon is attracted by a charged balloon? (AS_1)

9. List three states in India where earthquakes are more likely to occur. (AS_1)

10. Does your habitation lie in a earthquake prone area? Explain. (AS_1)

11. Which place in Andhra Pradesh experiences earthquakes most of the time? (AS_1)

12. When does a piece of matter have a "charge?" (AS_1)

13. What happens if two objects having the same charge are brought close to each other? What happens if two objects having different charges are brought close? Can you give an example for this? (AS_1)

14. Give two examples of effects in your daily life which are caused by transfer of charges. (AS_1)

15. Inflate two balloons and rub both of them with a cloth first and then with different material. Will they attract each other in both cases? (AS_3)
16. Which country in the world is frequently effected by earth quakes? Collect the information and photographs on the recent earthquake in Japan. (AS_4)
17. Find out if there is an organisation in your area which provides relief to those suffering from natural disaster. Enquire about the type of help they render to the victims of earthquakes. Prepare a brief report on the problems of the earthquake victims. (AS_4)
18. How do you relate the energy release during the collision of fault lines during earthquake to the atmospheric variation on the surface of the earth? (AS_4)
19. Describe with the help of a diagram an instrument which can be used to detect a charged body. (AS_5)
20. Colour seismic zones in India out line map. (AS_5)
21. Prepare a model of seismograph. (AS_5)
22. How do you appreciate the efforts of scientists to develop an instrument to measure the intensity and detect the source of earthquake? (AS_6)
23. Suppose you are outside your home and an earthquake occurs. What precaution would you take to protect yourself? (AS_7)
24. The weather department has predicted that a thunderstorm is likely to occur on a certain day. Suppose you have to go out on that day. Would you carry an umbrella? Explain. (AS_7)
25. If earthquake occurs in your area what will you do? (AS_7)
26. What are the measures you would take in your house when an earthquake occurs? (AS_7)