Some Natural Phenomena

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Q. 1. Which of the following cannot be charged easily by friction?
A. A plastic scale

B. A copper rod
C. An inflated balloon
D. A woollen cloth
E. Piece of wood

Answer : Only non-conducting materials can be charged by friction

Option (a) Plastic is non-conducting material hence it can be easily charged by friction.

Option (b) Copper is conducting material hence copper rod cannot be easily charged by friction. Therefore, it is the correct option

Option (c) Balloon is non-conducting material hence it can be easily charged by friction.

Option (d) Wool is non-conducting material hence it can be easily charged by friction.

Option (e) Wood is non-conducting material hence it can be easily charged by friction.

Q. 2. When a glass rod is rubbed with a piece of silk cloth the rod
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.

Answer : Option (a) when an object is charged by rubbing it against another object the two objects gets oppositely charged. Hence the same charge cannot be there on both rod and the cloth.

Option (b) by convention, it is considered that the charge acquired by the glass rod is positive and charge acquired by cloth is negative. Therefore, the rod becomes positively charged while the cloth has a negative charge. Hence (b) option is correct.

Option (c) when an object is charged by rubbing it against another object the two objects gets oppositely charged. Hence the same charge cannot be there on both rod and the cloth.

Option (d) by convention, it is considered that the charge acquired by the glass rod is positive and charge acquired by cloth is negative. Hence this option is not correct.

Q. 3. Identify True or False sentences among the following:

(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)

Answer : (a) False

Like charges repel each other and unlike charges attract each other.

(b) True

A charged glass rod has positive charge on its surface while the charged plastic straw has negative charge on its surface. And unlike charges attract each other therefore the above statement is true.

(c) False

During a lightning, the lightning conductor conducts all the atmospheric charges to the earth directly, leaving the building safe. Hence, the lightning conductor protect a building from lightning.

(d) False

The reason for the earthquake can be known, but no instrument could be invented to detect it till now. Hence, earthquakes cannot be predicted in advance.

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

Answer : The crackling sound is heard due to electric discharge between sweater and body. The sweater is made up of wool and the shirt we wear is made up of cotton blended with some synthetic fibers. When we take out the sweater the friction is developed and the transfer of electrons take place from shirt to sweater, this results in building of electric potential.

When enough potential has been accumulated while taking of the sweater it discharges and transfer of electrons take place. This transfer of electrons forms spark and let out sound energy and heat energy. Thus we hear the crackling sound and in dark room we may see the spark lights as well.

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

Answer : When we touch a charged object our body conducts its charges to the earth because our body is the conductor of electricity. Therefore a charged body loses its charge if we touch it with our hand. This phenomenon is called as electric discharge.

Q. 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?

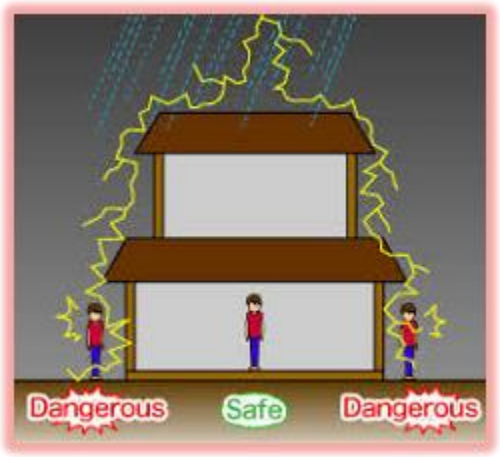
Answer : The destructive energy of earthquake is measured on the Richter scale, this scale is not linear and it has readings from 1 to 10.

The reading of 3 would be recorded by a seismograph. But the earthquake is not likely to cause much damage because generally the earthquake of measure higher than 5 are considered destructive in nature.

Q. 7. Suggest three measures to protect ourselves from lightning. .

Answer : Protective measures against lighting are as follows.

1. Stay indoors or in completely closed place. If you are moving in the car than remain there until the lighting is over.



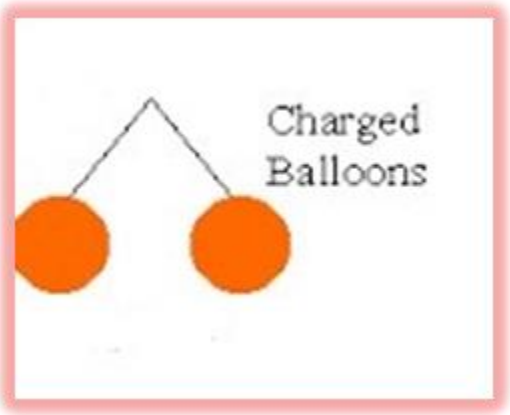
2. Do not touch any conductor of electricity like electric wires, telephone cables, metal pipes etc.

3. Do not take shelter under tree because you may get an electric shock due to water present on leaves of tree which will conduct electricity.

4. Switching off and disconnecting all heavy electrical appliances like Television, Air conditioner etc.

Q. 8. Explain why a charged balloon is repelled by another charged balloon whereas anuncharged balloon is attracted by a charged balloon?

Answer : The nature of the charges present on the surface of the charged balloon is same, Since the like charges repel each other. Therefore the two charged balloons repel each other. As shown in the figure below.



When the charged balloon is brought near the uncharged balloon, the uncharged balloon acquires the charge opposite to the charge of charged balloon and we know that unlike charges repel each other. Therefore the uncharged balloon is attracted by a charged balloon. As shown in the figure below.

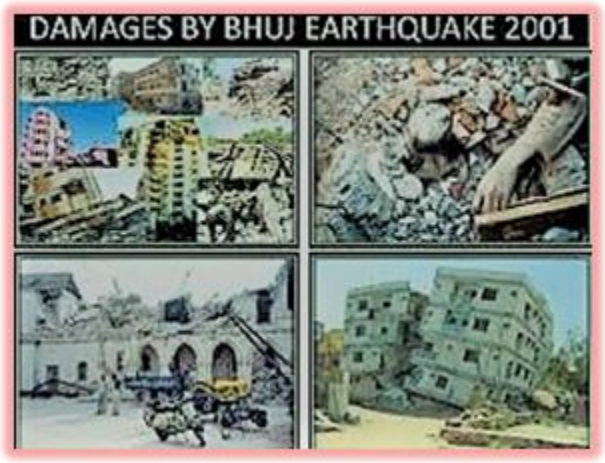
Q. 9. List three states in India where earthquakes are more likely to occur. .

Answer : The three states in India where the earthquakes are more likely to occur are:

1. Jammu and Kashmir Major earthquake occurred on 8th

October2005 in Uri and Tangdhar towns of North Kashmir.

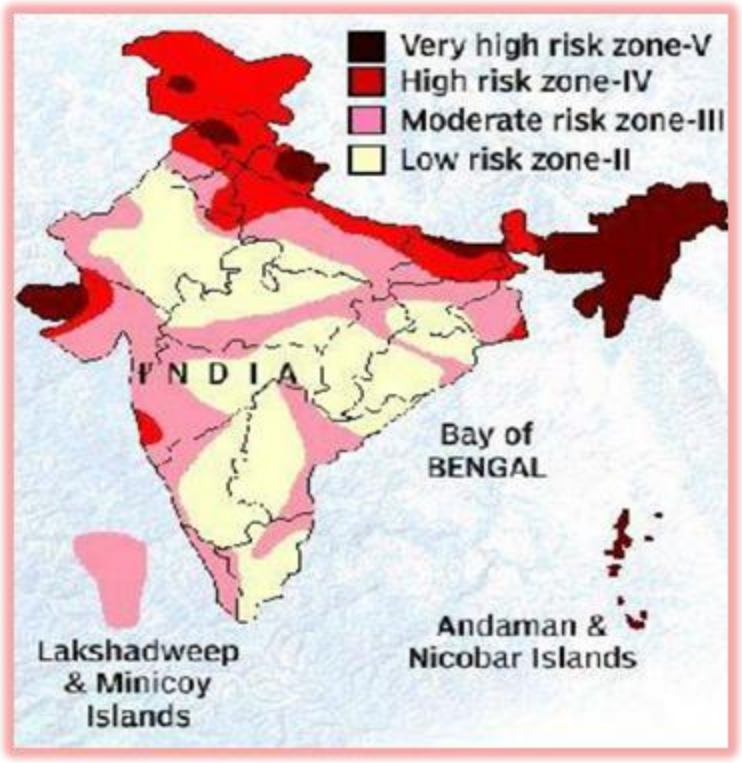
2. Gujarat Here Major earthquake occurred on 26th January 2001. In Bhuj District of Gujarat.



3. Assam in 1897 a devastating earthquake occurred which measured 7.1 on Richter scale.

Q. 10. Does your habitation lie in an earthquake prone area? Explain. .

Answer : I live in Madhya Pradesh and it is not an earthquake prone area because as we can see in the Map below which describes the earthquake prone areas in India. The Madhya Pradesh which is at center of India is in Low risk zone – II and Moderate risk zone – III.



Q. 11. Which place in Andhra Pradesh experiences earthquakes most of the time?

Answer : Andhra Pradesh falls in zone – II and III and is prone to moderate to low risk. The Major earthquake prone areas of Andhra Pradesh are:

1. Ongole This area has faced 12 earthquakes in the last 30 years including two big ones in 1967 and 7959 on Richter scale of 5.4 and 5. It is the most active zone in the state.

2. Vishakhapatnam The major earthquake occurred in 1827 and 1870.

3. East Godavari and West Godavari.

4. Vizianagaram.

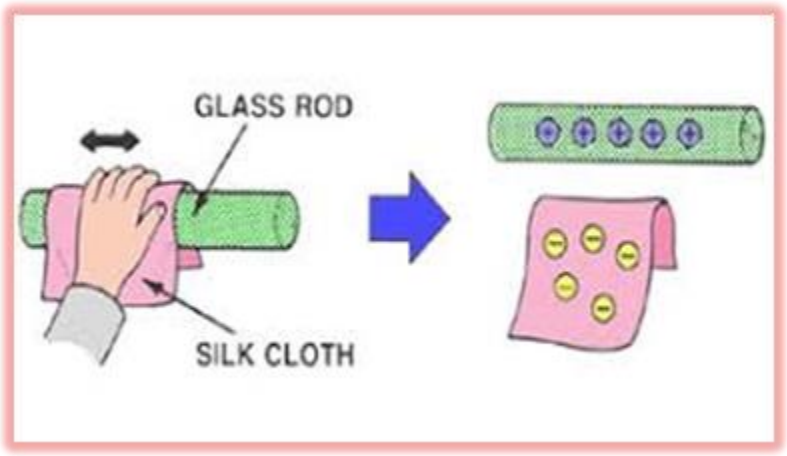
Q. 12. When does a piece of matter have a "charge?"

Answer : All matter in the universe is made up of atom. Every atom is made up of tiny particles called electrons, protons and neutrons. Generally the number of protons and electrons are equal and the atom is in neutral state.

An entire atom becomes electrically charged when the number of electrons and protons are not equal, means when some electrons are taken from the atom or are given to an

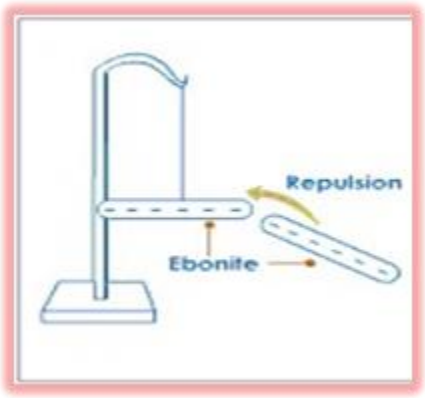
atom. The extra electrons or protons begin to attract the protons or electrons in other atoms.

Example: When a glass rod is rubbed with a piece of silk cloth the rod becomes positively charged while the cloth has a negative charge. As shown in the figure below.



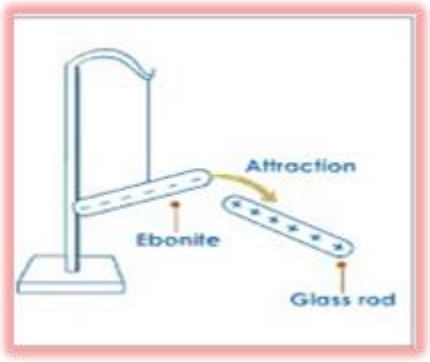
Q. 13. What happens if two objects having the same charge are brought close to each other? What happens if two objects having different charges are brought close? Can you give an example for this?

Answer : As we know that like charges repel each other. Therefore if two objects having the same charges are brought close they will repel each other. For Example when two ebonite rods having same charges are brought close to each other they repel each other as shown in figure below.



Since the unlike charges attract each other. Therefore if two objects having different charges are brought close they will attract each other. For Example When an Ebonite rod and glass rod

having different charges are brought close to each other they attract each other as shown in figure below.



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

Answer : We see many effects in our daily life which are cause due to transfer of charges. Some of them are as follows.

1. When we bring a comb rubbed with our head near small pieces of paper, the comb attracts the pieces of paper. As shown in figure below.

2. A balloon rubbed with woollen cloth attracted by a refill rubbed with polythene sheet.The figure below depicts the same.

Q. 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?

Answer : A balloon rubbed with woollen cloth repelled another balloon of the same type. Because the charges on the surface of both the balloon is same and we know that like charges repel each other. Hence the balloon repels each other as shown in the figure below.

When the balloon is rubbed with different material than both the balloons will acquire the same charge and they will repel each other.

Q. 16. Which country in the world is frequently effected by earth quakes? Collect the information and photographs on the recent earthquake in Japan.

Answer : Indonesia is in a very active seismic zone, also, but by virtue of its larger size than **Japan**, it has more total earthquakes because it lies on highly active seismic zone.

Below is the list of the recent Earthquakes in Japan:

1. Fukushima Earthquake On 22 November 2016 a Major Earthquake hit a Fukushima City of Japan with an intensity of 6.9. Fifteen people were injured during the earthquake, including broken bones and cuts from falling objects, three of them seriously. Below is the image of it.

2. Kumamoto Earthquake A series of 7 main shock stroked on 16 April 2016 beneath Kumamoto city. The entire city of Kumamoto city was left without water.

3. Kamaishi Earthquake The 2012 Kamaishi earthquake occurred near the city of Kamaishi, Japan, on December 7.The magnitude 7.3 shock generated a smalltsunami, with waves up to 1 m high.

Q. 17. Find out if there is an organization 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.

Answer :

Following are the organizations involved in providing the relief from the natural disaster:

1. Food and Agriculture Organization (FAC) Provides the food supply during the crisis.

2. International Organization for Migration (IOM) helps transfer refugees, internally displaced persons

3. United Nations Children's Emergency Fund (UNICEF) works to uphold children's rights, survival, development and protection by intervening in health, education, water, sanitation, hygiene and protection.

4. World Health Organization (WHO) provides global public health leadership by setting standards, monitoring health trends, and providing direction on emergency health issues.

Following are the problems faced by victims of earthquake:

1. It causes massive damage of infrastructure of the place due to which homes of people are destroyed.

2. Lots of injuries occur due to cuts and falling of trees, electric poles, and buildings on victims.

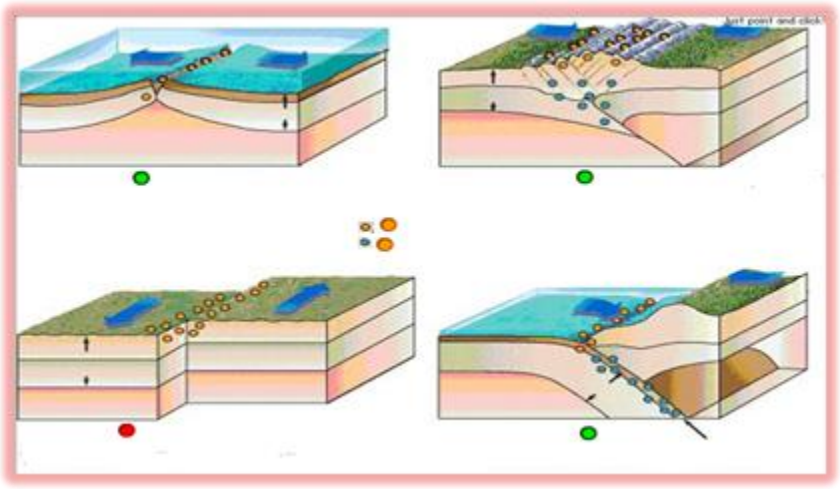
3. Scarcity of food due to destruction of crops and vegetables in fields of farmers.

4. Lack of money due to shut down of Banks and ATM.

5. Loss of study due to closing of colleges and schools.

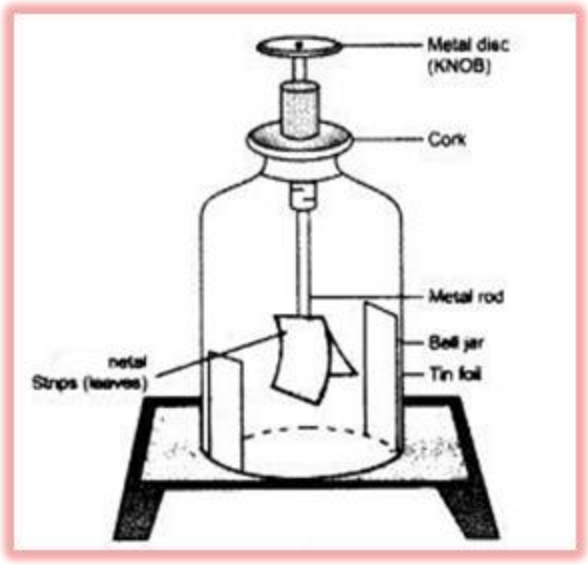
Q. 18. How do you relate the energy release during the collision of fault lines during earthquake to the atmospheric variation on the surface of the earth?

Answer : Earthquakes occur when energy stored in elastically strained rocks is suddenly released. This release of energy causes intense ground shaking in the area near the source of the earthquake and sends waves of elastic energy, called seismic waves, throughout the Earth. Within the Earth rocks are constantly subjected to forces that tend to bend, twist, or fracture them due to increase in temperature due to climate change. The figure below shows the relation between energy release and atmospheric variation.



Q. 19. Describe with the help of a diagram an instrument which can be used to detect a charged body.

Answer : An Electroscope is an instrument which can be used to detect whether a body is charged or not. The following figure shows the simple Electroscope.



Construction: An electroscope has a brass rod passing through a tight fitting cork in a glass bottle. A pair of thin aluminum leaves is attached to the lower end of the brass rod. To protect the aluminum leaves from external electric charge the lower half of the bottle is lined with tin foil which is 'earthed' by connecting it to the table.

Working: When a charged rod is touched to the metal disc, the charge is transferred to the aluminum leaves and they diverge.

Q. 20. Color seismic zones in India out line map. .

Answer : The Geological Survey Of India (G.S.I) first published the seismic zoning map of the India in the year 1935. This map tells us about the earthquake prone areas in India. The Map is color coded in different color which shows four different seismic zones of India. They are as follows:

1. Zone – II: This is the least active seismic zone.

2. Zone – III: It is included in the moderate seismic zone.

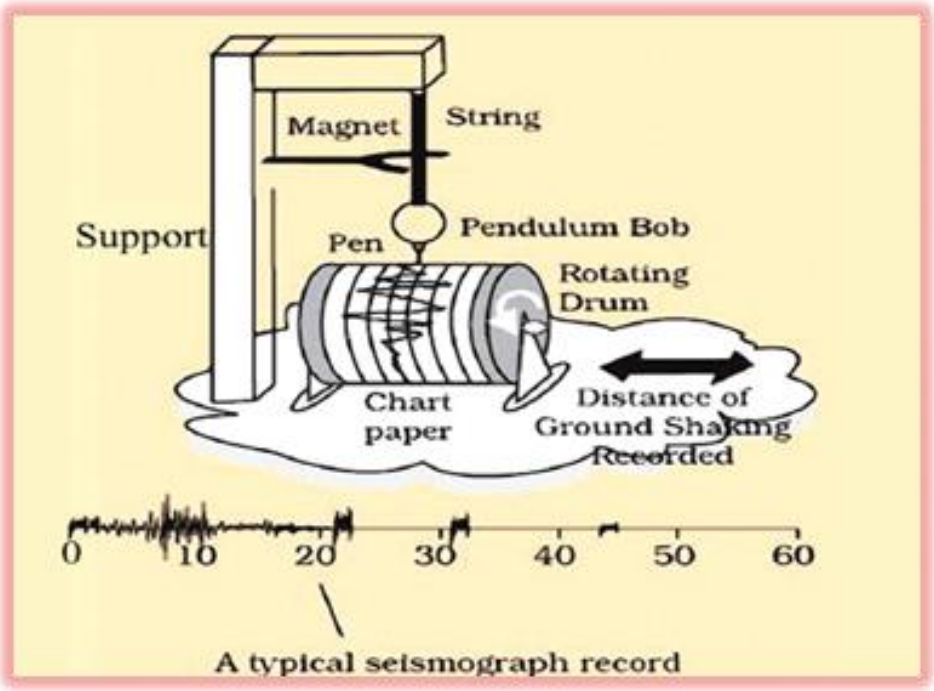
3. Zone – IV: This is considered to be high seismic zone.

4. Zone – V: It is the highest seismic zone.

The Map Below shows the Seismic Zones of India.

Q. 21. Prepare a model of seismograph.

Answer : The seismograph is an instrument that measures seismic waves caused by an earthquake. It consists of a vibrating rod, or a pendulum, which starts vibrating when tremors occur and A pen (stylus) which records the seismic waves on a paper. Figure below shows the typical seismograph.



Preparing Our Model Of Seismograph:

Materials Required: Shoebox, Paper or plastic cup, pencil, scissors, string, sellotape, long paper.

Procedure:

1. Carefully make two holes on the top of the shoebox.

2. Make one hole on the center of the bottom of the plastic or paper cup and two holes on either side of top of the cup.

3. Thread the string through the two holes in the cup and through the hole in the box. Cup should be dangling down inside the box.

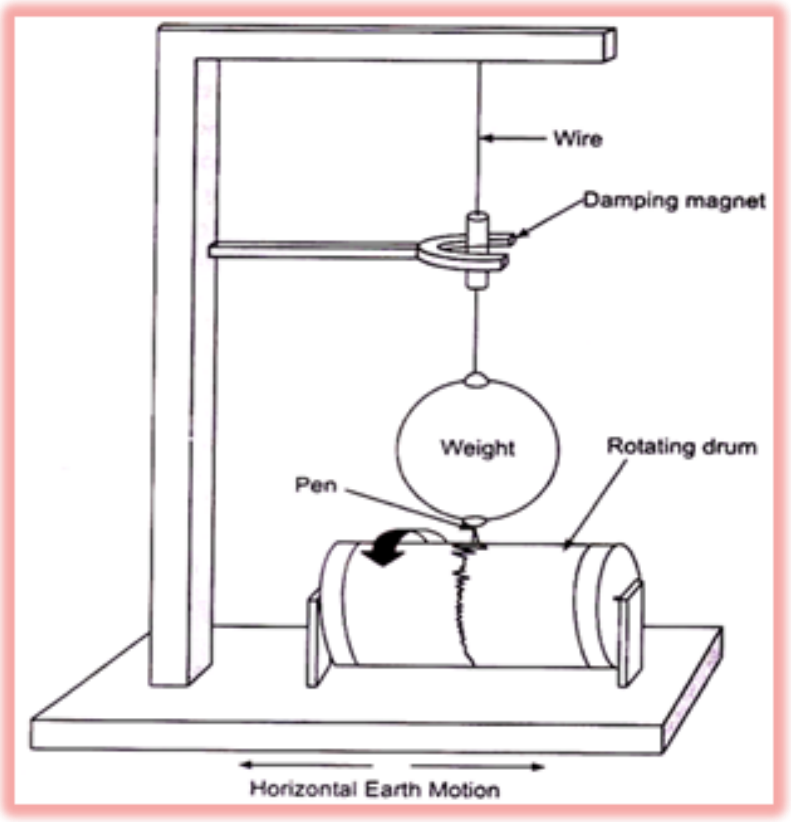
4. Tie the string so that the pen rests on the bottom of the box.

5. Carefully make a slit on either side of the bottom of the box and cut a length of paper that will pass through the slits.

6. Pass the paper through the slits. This makes your seismograph as shown in the figure below.

Q. 22. How do you appreciate the efforts of scientists to develop an instrument to measure the intensity and detect the source of earthquake?

Answer : We really appreciate the efforts of the scientists to in developing an instrument like seismograph which measures the intensity of the earthquake and detects the source of earthquake. If this instrument was not developed than we would not have got an idea about the intensity and cause of earthquake. The figure below shows the seismograph.



Another major contribution was the Richter scale developed by Sir Charles Francis Richter in 1935. This scale Measures the intensity of the earthquake on a scale from 1 - 10. This scale is used to rate the **magnitude of an earthquake, that is the amount of energy released during an earthquake.**

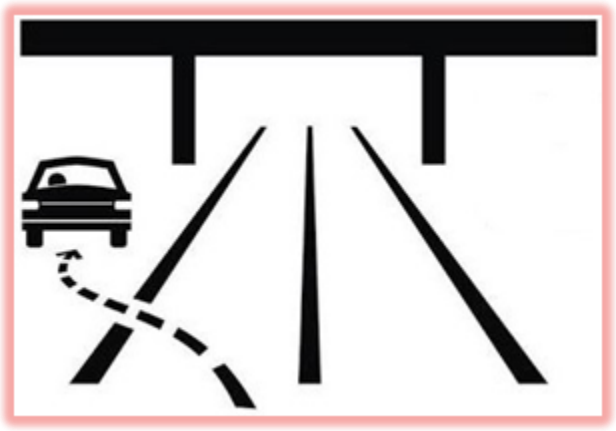
Sir Charles Francis Richter

Q. 23. Suppose you are outside your home and an earthquake occurs. What precaution would you take to protect yourself?

Answer : Some of the precautions that we will take to protect ourselves are as follows:

1. Move to an open area away from tall buildings, tall trees, electric wires and poles. As shown in the figure below.

2. If you are travelling in a bus or car than ask the driver to drive in an open field away from bridges and tall trees. The figure below depicts the same. As shown in the figure below.



3. If you are travelling in a vehicle than remain inside the vehicle.

4. Do not go to the crowded place.

Q. 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.

Answer : No, we should not carry an umbrella in the thunderstorm. Because during thunderstorm there is lightning and electric discharge from the clouds can travel through the metallic rod of the Umbrella (because metals are the good conductor of the electricity). This may give an electric shock to the person who is carrying umbrella. Hence it is not safe to carry an umbrella during the storm.

Q. 25. If earthquake occurs in your area what will you do?

Answer : Following thing will be done by us when the earthquake occurs in our area:

1. Move to an open area away from tall buildings and trees.

2. Help the children and old people to come out of their buildings.

3. Move away from the power lines, Building face, electric poles, chimneys, signboards etc.

4. Switch off the Main switch of electricity to prevent electric shocks.

5. Keep the First aid kit, torch, Drinking water because water and electricity supply is cut during the earth quake.

Q. 26. What are the measures you would take in your house when an earthquake occurs?

Answer : Following measures will be taken in our house when the earthquake occurs:

1. Drop down and take cover under a desk or table and hold on because it is the quickest way to protect ourselves. DO NOT use the elevators or lifts. Figure below illustrates the same.

2. Stay away from glass windows because glass can shatter during an earthquake and can cause harm.

3. Stay away from items that can fall and injure us like Furniture, fireplaces, fans, bookcases etc.

4. If you are in the bed stay there protecting your head with a pillow.

5. Turn off the water, gas and electricity mains switch because leakage of gas or water can cause the harm.