Lesson 15. Some Natural Phenomena

Grade VIII Basic concepts – A Flow Chart

SOME NATURAL PHENOMENA

Electric charge

- When two objects are rubbed together they get oppositely charged.
- Two types of charges – positive and negative charges.
- Like charges repel and unlike charges attracts.
- Charges produced by rubbing are called static charges.
- When charges move, they constitute an electric current.
- The process of transfer of charge from a charged object to the earth is called earthing.

Lightning

- A flash of bright light produced by an electric discharge between clouds or between clouds and the ground.
- Lightning Conductor: Metal rod fixed to an exposed part of a building to divert lightning into the earth.
- Lightning conductors can protect building from the effects of lightning.

Earthquake

- Richter Scale: A logarithmic scale, ranging from 1 to 10 for indicating .
- Seismic waves: the energy released at the focus of an earthquake, propagates outwardly.
- Seismograph: An instrument by which seismic waves of an earthquake are monitored.
- Earthquake; A sudden tremor in the earth's crust.
- Epicentre: A point on the earth above the seismic force.
- Fault zones: Earthquake prone areas in the earth's crust.

Know the Terms

- **Electroscope :** It is a device that can be used to test whether an object is carrying charge or not. Electroscope consists of closely placed two metallic (aluminium) foils or strips.
- **Seismic Zones :** Earthquakes are caused by the movement of plates; the boundaries of the plates are the weak zones where earthquakes are more likely to occur. These weak zones are also known as seismic or fault zones.
- **Seismic Waves :** The tremors produce waves on the surface of the earth. These waves are called seismic waves.
- **Lightning conductor :** Lightning conductor is a device which is used to protect the buildings from the effect of lightning.

Objective Type Questions **(1 Marks)**

I. Multiple Choice Questions

1. An electroscope is a device which is used to find if an object is : **(NCERT Exemplar)**

   (a) Charged (b) Magnetic (c) Free of cracks (d) Hot

2. Electric current is to be passed from one body to another. For this purpose the two bodies must be joined by : **(NCERT Exemplar)**

   (a) Cotton thread (b) Plastic string (c) Copper wire (d) Rubber band

3. The movement of the earth's plates causes :

   (a) Cyclones (b) Lightning (c) Earthquakes (d) Thunderstorms

4. Two charged objects are brought close to each other. Choose the most appropriate statement from the following options : **(NCERT Exemplar)**

   (a) They may attract.

   (b) They may repel.

   (c) They may attract or repel depending on the type of charges they carry.

   (d) There will be no effect.

5. Which of the following is not likely to cause Tsunami ? **(NCERT Exemplar)**

   (a) A major nuclear explosion under sea (b) Earthquake

   (c) Volcanic eruption (d) Lightning

6. The earth's plate responsible for causing earthquakes is : **(NCERT Exemplar)**

(a) The crust of the earth (b) The mantle of the earth

(c) The inner core of the earth (d) The outer core of the earth

7. Consider the list of terms given below : **(NCERT Exemplar)**

(i) Seismic Zone (ii) Fault Zone (iii) Mantle (iv) Inner Core

The boundaries of the earth's plate are known as

(a) (i) & (ii) (b) (iii) & (iv) (c) (i) & (iii) (d) (ii), (iii) & (iv)

8. The outermost layer of earth is called : **(NCERT Exemplar)**

(a) Mantle (b) Outer core (c) Crust (d) Inner core

9. Major earthquakes are less likely to occur in : **(NCERT Exemplar)**

(a) North East India (b) Rajasthan (c) Rann of Kutch (d) Orissa

10. Consider the list of terms given below : **(NCERT Exemplar)**

(i) Tsunami (ii) Landslide (iii) Floods (iv) Lightning

Earthquakes can cause :

(a) (i), (ii) & (iii) (b) (ii) & (iv) (c) (ii), (iii) & (iv) (d) (iii) & (iv)

1. (a)	2. (c)	3. (c)	4. (c)	5. (d)	6. (a)	7. (a)	8. (c)	9. (d)	10. (a)

II. Multiple Choice Questions

1. The resin which produces spark is

a. Gum b. Amber

c. Both a and b d. None of these

2. The like charges

a. Repel each other b. Attract each other

c. No interaction takes place d. All of these

3. The shaking of earth is called

a. Tsunami b. Volcano

c. Earthquake d. All of these

4. Lightning occurs due to

a. Electric discharge b. Rain

c. Wind d. Lord Varun's anger

5. Interaction of charges is called

a. Lightning b. Electrical discharge

c. Earthquake d. Earthing

6. Sparks can be seen on an electric pole when wires become

a. Loose b. Tight

c. Wrinkle d. None

7. Benjamin Franklin showed lightning in

a. 1725 b. 1527

c. 1752 d. 1572

8. The charge acquired by a glass rod when it is rubbed with a silk is

a. Negative b. Positive

c. Both d. None

9. Lightning occurred when two charges meet they are

a. Both positive b. Both negative

c. One positive and other negative d. None

10. Lightning conductor

a. Protects the building b. Destroys the building

c. No effect d. None

1. b	2. a	3. c	4. a	5. a
6. a	7. c	8. b	9. c	10. a

I. Fill in the blanks

1. Some objects can be charged by _____with other objects.

2. Like charges _____and unlike charges _____ each other.

3. The electric charge produced by rubbing is called _____charge.

4. When charges move, they constitute an _____ current.

5. An _____may be used to detect whether a body is charged or not.

6. _____strike could destroy life and property.

7. An _____is a sudden shaking or trembling of the Earth.

8. Destructive energy of an earthquake is measured on the _____.

1. rubbing	2. repel, attract	3. static	4. electric
5. electroscope	6. Lightning	7. earthquake	8. richter scale

I. Fill in the blanks

1. Sudden shaking of earth is called _____.
2. Amber is _____.
3. _____ , _____ can take place due to an earthquake.
4. A _____ can save a building from lightning strike.
5. The instrument used to measure earthquake is called _____.
6. A major tsunami occurred in the Indian Ocean on _____.
7. The uppermost layer of the earth is called _____.
8. The charged balloon _____ a charged balloon.
9. There are two kinds of charges _____ and _____.
10. Lightning , earthquake , tsunami are _____ phenomena.

1. Earthquake	2. Resin	3. Flood, tsunami	4. Lightning rod	5. Seismograph
6. 26 December 2004	7. Crust	8. Repel	9. Positive , negative	10. Natural

I. Match the following

1. Match the items given in Column A with those in Column B suitably.

Column A		Column B	
(i)	Richter Scale	(a)	Amber
(ii)	Earthquake	(b)	Meeting of (+ve) and (-ve) charges
(iii)	Resin	(c)	Protect houses
(iv)	Thunderstorm	(d)	Earthquake
(v)	Lightning rod	(e)	Shaking of earth

(i) . (d)	(ii) . (e)	(iii) . (a)	(iv) . (b)	(v) . (c)

2. Match the items given in Column A with those in Column B suitably.

Column A		Column B	
(i)	Rubbing	(a)	Electric current
(ii)	Moving charge	(b)	Seismic
(iii)	Weak zone	(c)	Static charge
(iv)	Like charges	(d)	Charge detecting device
(v)	Electroscope	(e)	Repel

(i) . (c)	(ii) . (a)	(iii) . (b)	(iv) . (e)	(v) . (d)

II. Match the following

Column I	Column II
1. Richter scale	(i) Electric current
2. Earthquake	(ii) Seismic
3. Resin	(iii) Static charge
4. Thunderstorm	(iv) Charge detecting device
5. Lightning rod	(v) Lightning
6. Rubbing	(vi) Amber
7. Moving charge	(vii) Meeting of the +ve and -ve charges
8. Weak zone	(viii) Protects houses
9. Destroys life and property	(ix) Earthquake property
10. Electroscope	(x) Shaking of earth

III. Match the following

Column A	Column B
a. Electrons	i. Undersea earthquake
b. Tsunami	ii. Dry air
c. Good conductor of electricity	iii. Attract each other
d. Bad conductor or electricity	iv. Wet air
e. Unlike charges	v. Negative charged

a. v	b. i	c. iv	d. ii	e.iii

I. True or False

1. Earthquakes occur all the time all over the world.
2. The plates of the outermost layer of the earth are always in continuous motion.
3. Tremors on the earth can also be caused by the eruption of a volcano.
4. The process of electric discharge cannot occur between clouds and the earth.
5. Bathing outdoors should be avoided during thunderstorm.
6. Like charges attract each other.
7. A charged glass rod attracts a charged plastic rod.
8. Lightning conductors cannot protect a building from lightning.
9. Earthquakes can be predicted in advance.
10. In ancient time when lightning occurred, people thought that the wrath of Gods was visiting them.
11. When a plastic refill is rubbed with polythene, no electric charge is developed.
12. When a glass rod is rubbed with silk, charge developed on rod is negative.
13. The current in a circuit makes a bulb glow.
14. If a thunderstorm occurs, there is always a possibility of lightning and cyclones accompanying it.
15. During earthquake if you are in bed, get up early and rush.

1. True	2. True	3. True	4. False	5. True	6. False	7. True	8. False
9. False	10. True	11. False	12. False	13. True	14. True	15. False	

II. True or False

1. We cannot predict cyclones.
2. We cannot predict earthquake.
3. We can use wired telephone at the time of lightning.
4. Richter scale is used to measure earthquake.
5. We should build heavy houses in a danger zone.
6. Lightning strike destroys life and property.

7. Like charges attract each other.

8. The electric charges produced by rubbing are called static charges.

9. The outermost layer of earth is in one piece.

10. In ancient times people did not know the true causes of earthquake.

1. False	2. True	3. False	4. True	5. False
6. True	7. False	8. True	9. False	10. True

Quiz Time

1. **What causes lightning?**
2. **When you take off woollen or polyester clothes in the dark, see a spark and hear crackling sound. Why?**
3. **Who proved that lightning and the spark from your woollen or polyester clothes are essentially the same phenomena?**
4. **What is the nature of electrical charges generated by rubbing the two objects?**
5. **Name a device that can be used to test whether an object is carrying charge or not.**
6. **How can we transfer electrical charge from a charged object to another?**
7. **Why do buildings are provided with earthing?**
8. **What causes an earthquake?**
9. **What is the name of the scale on which the power of an earthquake is expressed in terms of its magnitude?**
10. **Why does an earthquake of magnitude 6 has thousand times more destructive energy than an earthquake of magnitude 4?**

Answers :

1. Lightning is caused by the accumulation of charges in the cloud.
2. This is due to accumulation of charge obtained due to rubbing of polyester or woollen clothes with the skin.
3. Benjamin Franklin (1752), an American scientist.
4. Static nature.
5. Electroscope

6. Through a metal conductor
7. Earthing is provided in buildings to protect us from electrical shocks due to any leakage of electric current.
8. It is caused by a disturbance deep inside the earth's crust.
9. Richter scale.
10. Richter scale is not linear. It means that an increase of 2 in magnitude of an earthquake means 1000 times more destruction.

NCERT CORNER

Intext Questions

1. What is an earthquake? What happens when it occurs?

An earthquake is a sudden shaking of earth's plates due to collision. When earthquake occurs, we suffer a huge loss of life and property.

2. What can we do to minimize the effect of earthquake?

The buildings in seismic zones, where the earthquakes are more likely to occur, should be so designed that they can withstand major tremors.

3. Boojho wonders why they took so many years to realise the similarity.

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

4. Boojho : My grandmother told me 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?

No, we know that the earthquakes are caused by the disturbance deep down inside the uppermost layer of the earth called the crust.

5. What could cause a disturbance inside the earth?

The outermost layer of the earth is not in one piece. It is fragmented. Each fragment is called a plate. These plates are in continuous motion. When they brush against one another, or collide, or a plate goes under or moves away from another, they cause disturbance in the earth's crust. It is this disturbance that shows up as an earthquake on the surface of the earth.

6. Boojho : If scientists know so much about earthquakes, can they also predict when and where the next one will strike?

Although we know for sure what causes an earthquake, it is not yet possible to predict when and where the next earthquake might occur.

7. Paheli : I read somewhere that underground explosions could also cause earthquakes.

Tremors on the earth can also be caused when a volcano erupts, or a meteor hits the earth, or an underground nuclear explosion is carried out. However, most earthquakes are caused by the movement of the earth's plates.

Textbook Questions

Select correct option in question 1 and 2.

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

(b) A copper rod cannot be charged easily by friction.

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

(i) and the cloth both acquire positive charge.

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

(iii) and the cloth both acquire negative charge

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

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

3. Write T against true and F against false in the following statements :

(i) Like charges attract each other.

(ii) A charged glass rod attracts a charged plastic straw.

(iii) Lightning conductor cannot protect a building from lightning.

(iv) Earthquakes can be predicted in advance.

(i) False	(ii) False	(iii) False	(iv) False

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

During winters, we wear woollen sweaters which are in contact with our body and hair during taking off. Due to rubbing, the electrostatic charges develop on the sweater and our hair, which attract each other and produce a crackling sound while taking off the sweater.

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

When we touch the charged body, then charges produced on charged body, get transferred to our body and charged body becomes discharged or loses its charge.

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?

The destructive energy of an earthquake is measured on Richter scale. The earthquake of 3 Richter can be observed by a seismograph. The earthquake of 3 Richter magnitude is often felt and it rarely causes damage and it has frequency of occurrence 49,000 per year.

7. Suggest three measures to protect ourselves from lightning.

Lightning safety :

(i) Open vehicles, like motorbike, tractor, construction machinery, open cars are not safe. Open fields, tall trees in woods or isolated ones, shelters in a park, elevated places also do not protect from the lightning stroke.

(ii) Carrying umbrella is not a good idea at all during thunderstorm.

(iii) If in a forest, take shelter under shorter trees.

(iv) If no shelter is available, you are in an open field; stay far away from a tree as it is tall. Stay away from poles or other metal objects.

(v) Do not lie on the ground. Instead, squat low to the ground. Place your hands on your knees with your head between the hands. This position will make you the smallest target. Bathing should be avoided during thunderstorm to avoid contact with running water.

(vi) Electrical appliances like computer, TV etc should be unplugged. Electrical lights remaining on do not cause any harm.

(vii) Air conditions should be switched off to protect the machinery from damage.

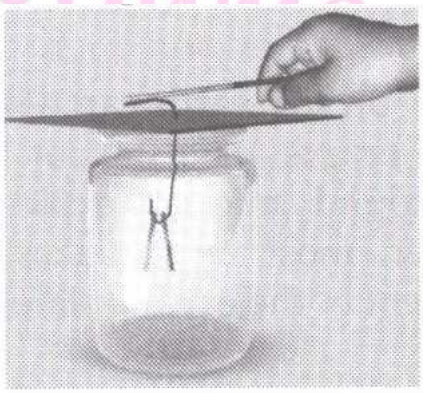
8. Explain why a charged balloon is repelled by another charged balloon whereas an uncharged balloon is attracted by another charged balloon?

A charged balloon is repelled by another charged balloon because both the balloons contain same type of charges. We know that like charges repel each other. If a balloon is

charged while other is uncharged, they don't have same charge. Therefore, charged balloon attracts uncharged balloon.

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

The instrument which is used to detect a charged body is an electroscope.



Construction :

(i) Take an empty jam bottle.

(ii) Take a piece of cardboard slightly bigger in size than the mouth of the bottle.

(iii) Pierce a hole in it so that a metal paper clip can be inserted.

(iv) Open out the paper clip.

(v) Cut two strips of aluminium foil about 4 x 1 cm each. Hang them on paper clip.

(vi) Insert the paper clip in the cardboard so that it remains perpendicular to it.

(vii) Charge a refill and touch it with the end of the paper clip:

Working :

(i) The aluminium foil strips receive the same charge from the charged refill through the paper clip. The strips carrying same charge repel each other, they become wide open.

(ii) Touch the end of paper clip gently with hand and we will find a change in the foil strips. Repetition gives the same result.

10. List three states in India where earthquakes are more likely to strike.

(i) Kashmir, (ii) Rajasthan, (iii) Gujarat.

11. Suppose you are outside your home and an earthquake strikes. What precautions would you take to protect yourself?

(i) We should move to an open space.

(ii) We should not take shelter under trees or buildings.

(iii) If we are driving, we should slow down the vehicle and move slowly away from that area to a clear spot.

12. 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.

No, we will not take an umbrella at the time of thunderstorm. Taking umbrella will increase the risk of lightning. The wide objects are more prone to lightning strike.

I. Very Short Answer Type Questions.

1. What are the three destructive natural phenomenon?

Winds, storms and cyclones are the three natural phenomenon which are destructive.

2. Name two other destructive phenomenon.

Lightning, earthquakes.

3. What are the two types of charges?

There are two types of charges;

(i) Positive charges

(ii) Negative charges

4. What are the interactions of these two types of charges with each other?

(i) Like charges repel each other.

(ii) Unlike charges attract each other.

5. What is lightning?

Lightning is an electric spark on huge scale.

6. What is the cause of lightning?

Lightning is caused by the accumulation of charges in clouds.

7. What is amber?

The amber is a kind of resin.

8. What happens when amber is rubbed with fur?

When amber is rubbed with fur, it attracts light object.

9. What is static electricity?

The electricity generated by rubbing is called static electricity because the charges do not move.

10. Who discovered the static electricity or lightning in clouds?

Benjamin Franklin in 1752.

11. What are charged objects?

The objects which acquire a small charge or rubbing are called charged objects.

12. Write the nature of charges on a glass rod and silk cloth when they are rubbed with each other.

The charge on glass rod is positive while on silk cloth is negative.

13. What is an electric current?

The flow of charges is called electric current.

14. Name the device which is used to test whether an object is charged or not.

Electroscope.

15. Name the material used to transfer of charges form one body to other.

Metallic conductors.

16. What do you mean by earthing?

The process of transferring of charges from a charged body to the earth is called earthing.

17. Write the importance of earthing.

Earthing is provided in building to protect us from electrical shocks eu to any leakage of electrical current.

18. What is an electric discharge?

The process of meeting of negative and positive charges to release huge amount of energy is called electric current.

19. What are the safe places during thunderstorm?

The covered vehicle sand buildings are safe during thunderstorm.

20. When you are in open where should you take shelter?

We should take shelter under small trees.

21. Is sitting on motor cycle safe or not during lightning?

No, it is not safe.

22. What are the harmful effects of lightning on a lighting victim?

Loss of memory, loss of sight or hearing, broken bones etc.

23. Name the device sued to save multistoryed building from lightning.

Lightning rod conductor.

24. Where is the lightning rod attached to protect the building from lightning?

On the top of the building.

25. Define lightning conductor.

The device which is used to protect the buildings from the effect of lightning.

26. Name some natural phenomenon which can be predicted to some extent.

Thunderstorm, lightning and cyclones.

27. Name a natural phenomenon which cannot be predicted yet now.

Earthquake.

28. What is an earthquake?

An earthquake is a sudden shaking or trembling of the earth which lasts for a very short time.

29. Write the cause of earthquake.

Earthquake is caused by a disturbance deep inside the earth's crust.

30. What are other natural phenomenon caused by earthquake?

Earthquake can cause floods, landslides and tsunamis.

31. What is tsunami?

The earthquake under the oceans is called tsunami.

32. When and where a major tsunami takes place in India?

A major tsunami occurred in the Indian Ocean on 26 December 2004.

33. Is it true that earth is balanced on the horn of a bull, when bull shifts its horn an earthquake takes place?

No. It is not true.

34. Name the instrument used to measure earthquake.

Seismograph.

35. Write the other causes of tremors on earth.

Tremors on earth can also be caused when a volcano erupts, underground nuclear explosion and meteor hits the earth.

36. What are seismic or fault zones?

The weak zones where earthquakes are more likely to occur are called seismic or fault zones.

37. What are seismic waves?

The tremors produce waves on the surface of the earth. These waves are called seismic waves.

38. When two charged body having positive on one body while other has unknown charge. When these come in contact, they repel each other. What type of charge on other body?

Positive charge, because like charges repel each other.

39. Name two most destructive natural phenomenon takes place on earth.

(i) Earthquake (ii) Lightning

40. What is earth's crust?

The uppermost layer of earth is called crust.

II. Very Short Answer Type Questions.

1. If a charged plastic straw is brought near another uncharged plastic straw, what will happen? (NCERT Exemplar)

Any charged plastic straw will attract another uncharged plastic straw, when brought near it.

2. Plastic straws A and B are rubbed with dry cotton cloth. What will happen, if they are brought near each other? (NCERT Exemplar)

The straws will acquire the similar charge and hence they will repel each other.

3. Name two destructive phenomena.

Lightning, earthquake

4. What are two types of charges?

Positive charge, negative charge.

5. What is lightning?

Lightning is an electric spark on a huge scale.

6. What is amber? What happens when amber is rubbed with fur?

Amber is a kind of resin. It attracts light objects when rubbed with fur.

7. What is static electricity?

The electricity generated by rubbing is called static electricity.

8. Who discovered the static electricity or lightning in clouds?

Benjamin Franklin in 1752

9. What are charged objects?

The objects that acquire small charges on rubbing are called charged objects.

10. What is an electric current?

When charges move then the electricity is called electric current.

11. What are the safe places during thunderstorm?

The covered vehicles and buildings are safe during thunderstorm.

12. Name the device used to save multi-storied building from lightning.

Lightning conductor.

13. What are other natural phenomena caused by earthquake?

Earthquake can cause floods, landslides, tsunami and epidemic.

14. Name the instrument used to measure earthquake.

Richter scale.

III. Very Short Answer Type Questions.

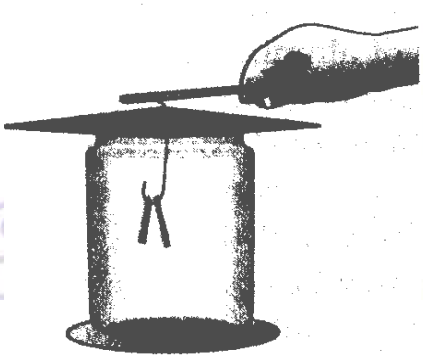
1. Is it possible to predict the occurrence of an earthquake?

No

2. If charged plastic straw is brought near another uncharged plastic. Straw, what will happen?

The two attract each other.

3. The aluminum strips in an electroscope as shown in figure below are replaced by plastic strips and a charged body is brought in contact with the metal clip. What will happen?



No divergence of strips will take place.

4. Plastic straws A and B are rubbed with dry cotton cloth. What will happen if they are brought near each other?

They will repel each other.

5. What charge does a glass rod acquire on being rubbed with silk cloth?

The glass rod acquires a positive charge by rubbing it with silk cloth.

6. How do you measure the earthquake wave?

By an instrument called seismograph

I. Short Answer Type Questions.

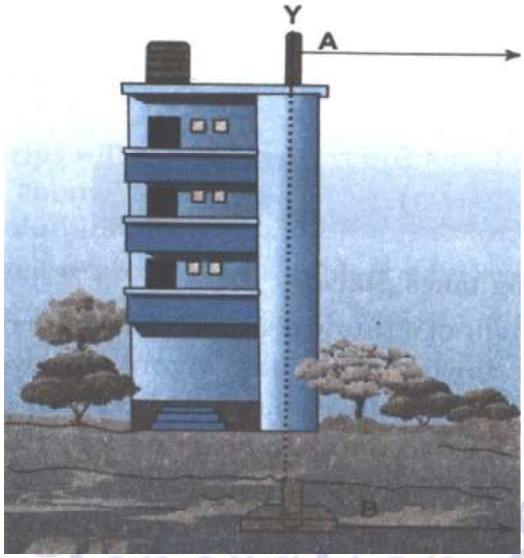
1. During the construction of a building the lightning conductor was left hanging in the air by mistake. Would the lightning conductor be still effective? Explain.

No, it will not be effective. Since lightning conductor was not connected properly to the earth, therefore, the charge will not pass through to the earth.

2. If air and cloud were good conductors of electricity, do you think lightning could occur? Explain.

No, it will not occur. The charge separation cannot take place in conductors. Therefore, charge will not accumulate on cloud and so lightning cannot take place.

3. Identify the lightning conductor and the copper plate in the figure given below.



A is the lightning conductor and B is the copper plate.

4. If the materials used for constructing a building were good conductors, do you think lightning will strike the building? Will the lightning conductors be will required to be installed in the building?

No, there is no need to install lightning conductor in the building.

5. You might have observed on a dry day that when you touch the screen of a television or computer monitor (with picture tube), you get a slight shock, why does it happen?

Electric charge gets accumulated on the screen. On tuching the screen the charge discharges through our body, thus, we get a slight shock.

6. Explain how does lightning conductor protects a building from getting struk by lightning.

Lightning conductor does not allow the charge to accumulate on a building as it conducts the charge to the earth, protecting building form being struck by lightning.

7. In an electroscope if a negatively charged body is brought in contact with the metal clip, the strips of the electroscope diverge, if now another charged object carrying equal amount of positive charge is brought in contact with the clip, what will happen?

If a positively charged object is brought in contact with the clip of an electroscope, the negative charge given earlier will be neutralized and the strips will collapse .

8. The strips of an electroscope diverge when a charged body is brought in contact with the metal clip. Now the clip is touched gently by our hand. What will happen to the strips? Explain.

The charge that was in the electroscope strips will get discharged through our hand. The strips will come back to the original state.

9. Explain why it is safer to use a wireless telephone instead of a landline telephone during lightning.

Lightning is an electrical discharge. During lightning atmospheric electric charge may discharge through landline telephone wires and may become dangerous, therefore it is safer to use a wireless telephone instead of a landline telephone during lightning.

II. Short Answer Type Questions.

1. What are the causes of sparking?

Causes of sparking;

(i) On electric pole wires become loose.

(ii) Blowing of wind and shaking the wires.

(iii) Looseness of plug in its socket.

2. What happens when amber is rubbed of fur?

When amber is rubbed with fur, it attracts light objects such as hair. In the same way woollen and polyester clothes also attract light objects.

3. Who established the relation between sparks produced by amber and the thunderstorms?

An American Scientist Benjamin Franklin established that sparks produced by amber are similar to those produced in sky during a thunderstorm. He flew a kite tied with a silken thread, which had an iron key attached to it on a rainy day. During lightning he felt the shock through iron key, which proved that clouds also carried charges.

4. How can charging take place when the substances are rubbed?

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 also acquires a small charge. These objects are called charged objects. In this process of charging the refill and the plastic comb, polythene and hair also get charged.

5. How many different types of charges are there? Write the nature of charges on glass rod and silk cloth when they are rubbed each other?

There are two types of charges;

(i) Positive charge and (ii) Negative charge.

Charge acquired by a glass rod rubbed with silk is called positive charge and the charge acquired by silk cloth is called negative charge.

6. What is static electricity? How is it different from electric current?

The electrical charges generated by rubbing produce static electricity. The charges do not move in static electricity while charges move in current electricity.

7. What is electric discharge? How does it occur?

The negative and positive charges meet, producing streaks of bright light and sound. This process is called electrical discharge, the process of electric discharge can occur between two or more clouds or between clouds and earth.

8. How does electric discharge occur in clouds?

At the time of thunder negative charges get accumulated near the clouds and positive charges accumulate near ground. When these charges meet electric discharge takes place

between ground and clouds. In this process a large amount of energy is released as thunder and lightning.

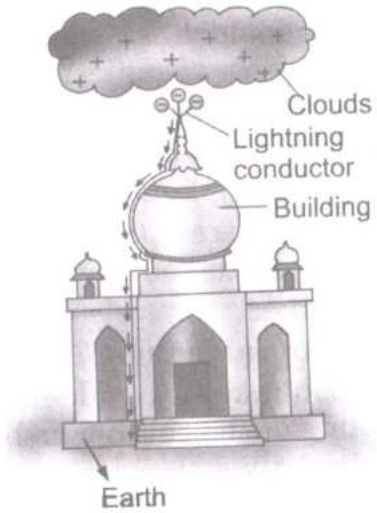
9. During lightning what should we do?

(i) Hearing thunder is an alert to rush to a safer place.

(ii) After hearing the last thunder wait for some time before coming out.

10. What is lightning conductor? How does it protect building from lightning?

Lightning conductor is a device sued to protect building from the effect of lighting. 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. The rod provides easy route for transfer of electric charge to the ground.



Lightning conductor

11. What is an earthquake? How does it occur?

An earthquake is a sudden shaking or trembling of earth which lasts for a very short time. It is caused by a disturbance inside the earth's crust. There can be a great loss to life and property. They can cause flood, tsunami and landslides. The magnitude of the earthquake is measured by an instrument called seismograph and it is measured on Richter Scale.

Kashmir earthquake

12. Write about two last major earthquakes in India.

(i) A major earthquake occurred on 26 January 2001 in Bhuj district of Gujarat.

(ii) A major earthquake also occurred in India on 8 October 2005 in Uri and Tangdhar towns of North Kashmir.

13. Name the regions of the earth more prone to earthquakes.

Earthquakes are caused by the movement of plates. The regions which fall on the boundaries of these plates are called anger zones. Earthquakes are most likely to happen in these danger zones.

14. What are fault zones? Name the fault zones in India.

The areas fall between the boundaries of two plates are called weak zone or seismic or fault zones. In india the most threatened areas are Kashmir , Western and Cenral Himalayas, whole of North-East, Rann of Kutch, Rajasthan , Indo-Gangetic plain and some areas of south India.

Movements of Indian earth's plate

III. Short Answer Type Questions-I

1. Is it possible to predict the occurrence of an earthquake?

No, scientists have tried lots of different ways of predicting earthquake but none have been successful so far. They have an idea of where an earthquake is most likely to hit but they still cannot tell exactly.

2. What is earthing? What is its importance?

The process of transferring of charge from a charged object to the earth is called earthing. It is provided in buildings to protect us from electrical shocks due to any leakage of electric current.

3. What is an earthquake? What is its cause?

An earthquake is a sudden shaking or trembling of the earth, which lasts for a very short time. It is caused by movement of plates of outermost layer of earth.

4. What are seismic or fault zones?

Since earthquakes are caused by movement of plates, the boundaries of the plates are the weak zones where earthquake occurs. These weak zones are also known as seismic or fault zones.

5. What will you do on being struck by lightning?

On being struck by lightning, victim carries no electrical charge. The death by lightning occurs due to cardiac arrest and stopped breathing. We can give first aid by performing CPR and mouth to mouth breathing.

II. Short Answer Type Questions-II

1. You might have observed on a dry day that when you touch the screen of a television or computer monitor (with picture tube), you get a slight shock. Why does it happen?

(NCERT Exemplar)

It happens because the television screen and computer monitor are charged and have static charges and when we touch them with our hands which are uncharged, the charges attract our hands and transfer through our hands and we get a small shock.

2. Mention three precautions that you will take to protect yourself, if earthquake strikes when you are inside the house. (NCERT Exemplar)

Three precautions during earthquake inside the house are as follows :

(i) Instead of running away, we should get under a desk, table or bench or sit against a nearby interior wall.

(ii) Pick a safe place where things will not fall on us, away from windows, bookcases or tall heavy furniture.

(iii) Wait at safe place until the shaking stops.

3. If the materials used for constructing a building were good conductors, do you think lightning will strike the building. Will conductor be still required to be installed in the building? (NCERT Exemplar)

Lightning will not strike the building because all the lightning falling on the building will reside on the surface of the building. Now, there is no need of installing any lightning conductor because all the work of lightning conductor is done by the conducting material itself.

4. In an electroscope if a negatively charged body is brought in contact with the metal clip, the strips of the electroscope diverge. If now another charged object carrying equal amount of positive charge is brought in contact with the clip, what will happen? (NCERT Exemplar)

As it is clear whether we bring a body with positive or negative change, the strips will repel always because equal amount of charges are transferred to the strips and like charges always repel each other.

5. What precautions would you take if lightning occurs while you are outside the house? (NCERT Exemplar)

Precautions during lightning while we are outside are as follows :

(i) Do not stand underneath a natural lightning rod such as a tall and isolated tree.

(ii) Stand away from any fountain or any water body.

(iii) Get away from tractors and other metal equipments like wire fences, metal pipes, rails and other metallic paths.

6. Write Do's and Don'ts during a thunderstorm.

Outside the house :

(i) Open vehicles, such as motor bikes, tractors, construction machinery, and open cars are not safe.

(ii) Open fields, tall trees, shelters in park, elevated place do not protect us from lightning strokes.

(iii) Carrying an umbrella is also not safe.

(iv) Stay away from poles or other metal objects.

Inside the house :

(i) During a thunderstorm contact with telephone cords, electrical wires and metal pipes should be avoided.

(ii) It is safe to use mobile phone.

(iii) Bathing should be avoided.

(iv) Electrical appliances like computers, TVs etc. should be unplugged. Electrical lights can remain on.

7. What are seismic waves? How can it be measured?

The tremor produces waves on the surface of the earth. These waves are called seismic waves. The waves are recorded by an instrument called the seismograph. This instrument is simply a vibrating rod or a pendulum, which starts vibrating when tremors occur. A pen is attached to the vibrating system that records the seismic waves on a paper. By studying these waves, scientists can construct a complete map of the earthquake.

I. Long Answer Type Questions.

1. Explain how lightning takes place. (NCERT Exemplar)

Clouds having water droplets, coming from different directions, strike each other and due to striking, a friction force is created when they rub each other and during rubbing, the charges appear on clouds (static charges). They grow up due to continuous charging and finally discharge when any moist place is found on the earth because they get the path due to this place.

2. If the metal clip used in the electroscope is replaced by an ebonite rod and a charged body is brought in contact with it, will there be any effect on the aluminium strips? Explain. (NCERT Exemplar)

Since, ebonite rod acquires charge when rubbed, so, the charge transfer will be either too less or there will be no transfer of charges, so the strips of aluminium will not be wider and we are not able to predict whether the object is charged or not.

3. Explain protection against earthquake.

Protections against earthquake : Earthquakes cannot be predicted. They can be highly destructive. It is, therefore, important that we take necessary precautions to protect ourselves all the time. It is advisable to make the structure 'Quake Safe'.

(i) Consult qualified architects and structural engineers.

(ii) In highly seismic area the use of mud and timber is better. They keep roofs light.

(iii) Fix shelves and cupboards to the walls.

(iv) Be careful where you hang wall clocks, photo frames, water heaters etc.

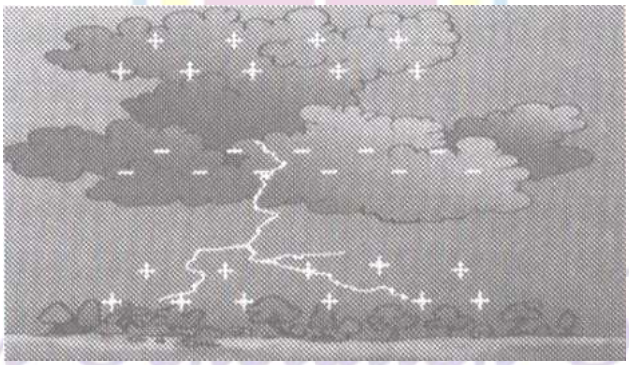
(v) Building can catch fire during earthquake. So all buildings must have fire fighting equipments in working order.

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

At home : Take shelter under a table, stay away from tall and heavy objects and if you are in bed, do not get up. Protect your head with a pillow.

Outdoors : Find a clean spot, away from buildings, trees, and overhead power lines. Drop to ground. If you are in car or bus do not come out.

4. Explain the mechanism of thunderstorms or story of lightning.



Mechanism of thunderstorm or the story of lightning : During the development of a thunderstorm, the air current moves upwards, while the water droplets move downwards. These vigorous movements can cause separation of charges. By a process, the positive charges collect

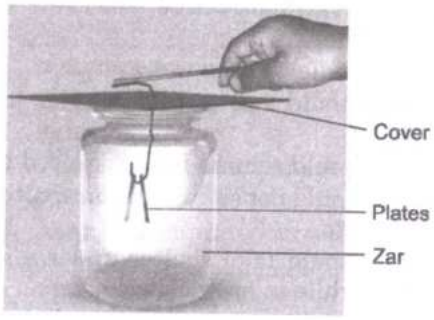
near the upper edges of the clouds and the negative charges accumulate near the lower edges. There is accumulation of the charges near the ground also. When the magnitude of accumulated charges becomes very large, negative and positive charges meet. It produces streaks of light and sound. This process is called electric discharge.

II. Long Answer Type Question.

1. Explain the construction and working of electroscope.

The device which is used to test whether an object is carrying charge or not is called electroscope.

Construction and working : An electroscope has a metal rod with in metal strips or leaf attached to it at the bottom. At the top, the rod enters in a cup. The bottom part of the rod and leaf are enclosed in a glass bottle for protection. When the knob of the electroscope is touched with a charged ebonite or glass rod, the leaves open out or diverge. Extent of divergence depends upon the amount of charge on the electroscope.



A simple electroscope

2. How can you save yourself from lightning?

Some safety measures are;

(i) We should run to take shelter in the house.

(ii) We should remain in the covered area.

(iii) We should not sit in open, on scooters or bike etc.

(iv) We should take shelter under a small tree while in open.

(v) If there is no tree or other shelter we should sit with head folded.

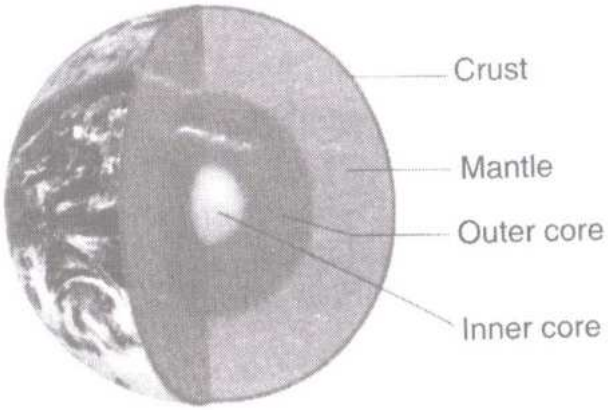
(vi) We should plug out all the electrical appliances during lightning.

(vii) We should not use wired telephones during lightning. Mobiles and cordless phones are safe.

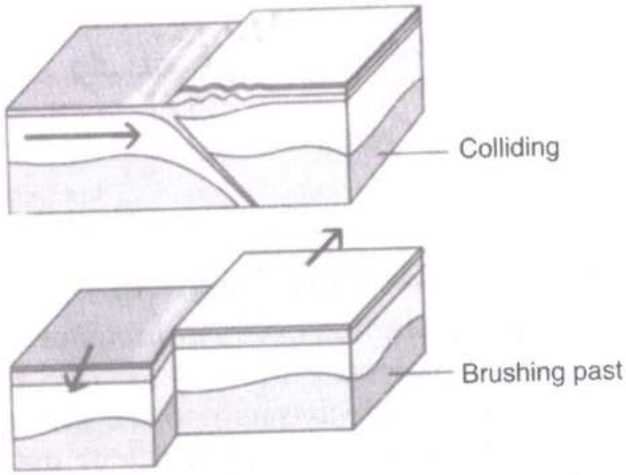
Safe position during lighting

3. Explain the mechanism of earthquakes.

The tremors are caused by the disturbance deep down in the uppermost layers of earth. The uppermost layer of earth is called crust. The curst of earth is not a one piece. It is fragmented. Each fragment is called a plate. These plates are in continual motion. When they brush past one another or a plate goes under another due to collision, they cause disturbance and show up as an earthquake on the surface of the earth. Although we know the causes of the earthquake, it is not possible to predict when and where the next earthquake might occur.



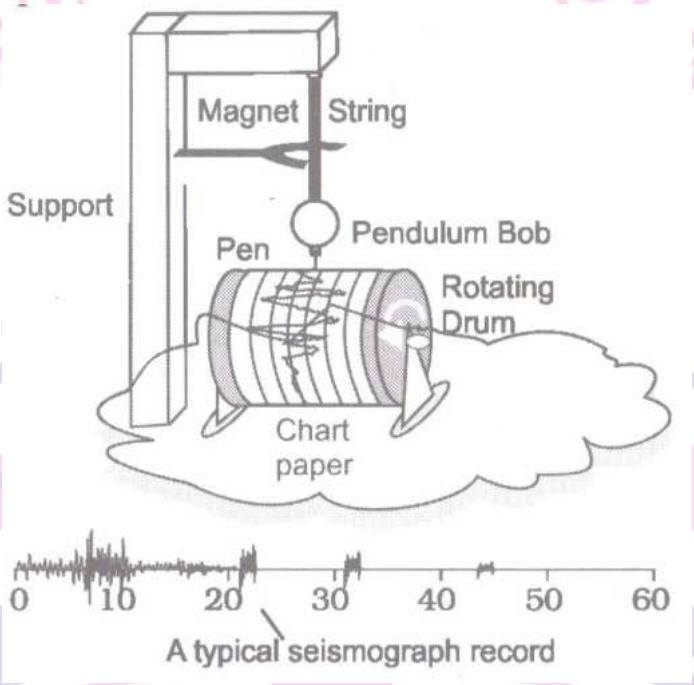
Structure of the earth



Movements of earth's plates

4. What is a seismograph? How does it work?

The instrument used to record the seismic waves is called seismograph. The tremors produce waves on the surface. The instrument is simply a vibrating rod or a pendulum. Which starts vibrating when tremors occur. A pen is attached to vibrating system. The pen records the seismic waves on a paper which moves under it. By studying these waves scientists construct a map of earthquake. They can also estimate its power to cause destruction.



III. Long Answer Type Question.

1. What should you do during an earthquake?

During an earthquake, we should

a. Try to get out of the high-rise building. If you cannot get out safely, hide under a desk or a study table.

b. get into an open area, away from trees, buildings and power lines, in a hilly terrain, it is advisable to stay away from slopes.

c. not run outside blindly, one may get killed by falling bricks and debris just outside the buildings we should not use lifts during an earthquake.

d. ask the driver to take the vehicle on a side of the road. If you are in a moving vehicle, keep away from the bridges, trees, buildings and power lines, stay inside the vehicle and wait for the shaking to stop.

e. not rush to the roof of the house. Never enter a cracked or partially damaged house. The slightest movement may lead to its collapse. If you are in bed, protect you head with a pillow.

2. What precautions would you take if lightning occurs while you are outside the house?

a. seek for a shelter. Buildings are best for shelter.

b. Stay away from poles or other metallic objects

c. Stay away from tall trees.

d. Stay away from open vehicles like motorbikes, tractors, construction machinary , etc.

I. High Order Thinking Skills (HOTS) Questions.

1. Mention the names of the natural phenomena which can be predicted to some extent.

Thunderstorm, lightning and cyclones are the natural phenomena that can be predicted.

2. How does earthing help to protect buildings?

Earthing helps to transfer unwanted electric charges in electrical circuits to flow to earth and in this way it prevents the electrical equipments from damage.

3. If an object is touched with the metal top of an electroscope its aluminium leaves diverge then what conclusion do we get from this observation?

We get conclusion from this observation that the object has an electric charge on it.

4. Explain how the buildings should be designed and constructed in seismic zones.

In seismic zones, all the houses and buildings should be designed and constructed in such a way so that they can withstand major earthquake tremors.

II. High Order Thinking Skills (HOTS) Questions.

1. What would happen if two balloons rubbed with wool are brought together?

The two balloons will repel each other because when they are rubbed with wool, negative charges move from wool to balloons, both balloons become negatively charged and therefore repel each other.

Value Based Questions.

1. Priya went to the school with umbrella on rainy season. One day, while returning from the school the rain started on the way. Priya opened her umbrella and saved herself from rainwater. After some time, she observed some lightning sparks in the sky. Suddenly, she folded her umbrella and went to a shelter under a closed building.

(i) State the cause of lightning.

(ii) Priya folded her umbrella. Explain why.

(iii) Mention the method opted by Priya here.

(i) In the clouds, accumulation of charges causes lightning.

(ii) As we know the top end of stretched umbrella is a metal part. Since, the metal is a good conductor of electricity, so if lightning strikes the ground, then it can take the path towards umbrella. Therefore, to avoid herself from danger, Priya folded the umbrella and went to closed building.

(iii) The immediate response and the scientific method are opted by Priya here.

2. During the natural disaster (Tsunami) in Japan, the nuclear reactors were damaged, due to which hazardous radiation affected the large areas.

(i) What was the reason for this damage?

(ii) How did it affect the people and environment?

(iii) Do you think that nuclear energy is good for nature?

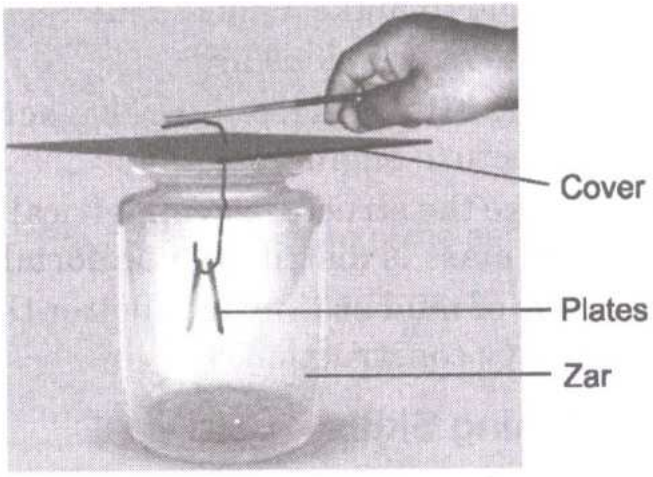
(i) The uranium and other elements which radiate large amount of heat and energy and it is very harmful for living beings.

(ii) It affected the people on skin, eyes even on genes also and the particles got embedded in environment which continuous pollute it by emitting radiations.

(iii) When it is used in good of humans then only it is good because small amount of atom gives huge amount of energy.

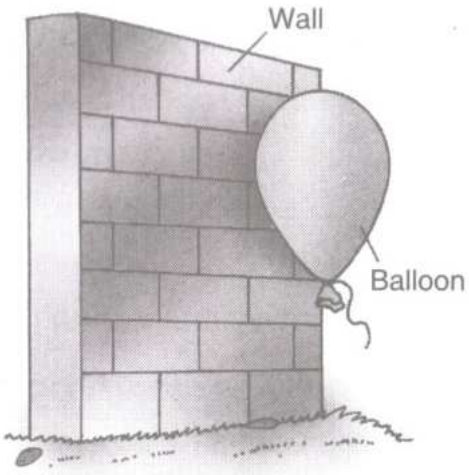
Skill Based Questions

1. Draw diagram of an electroscope and write its use.

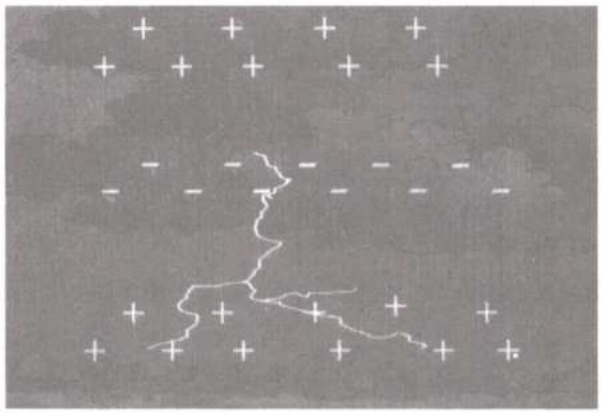


The electroscope is used to test whether an object is charged or not.

2. Draw a diagram of balloon to show the interaction of charges.

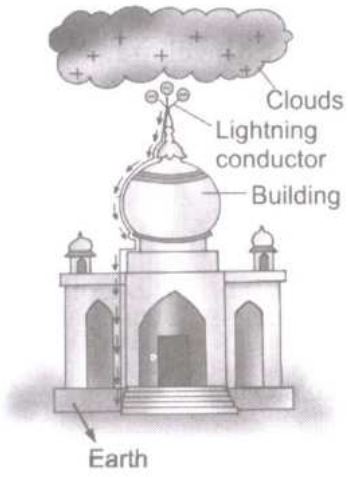


3. Draw a diagram to show the accumulation of charges. What is an electric discharge?



The process in which negative and positive charges meet to produce streaks of bright light and sound is called electric discharge.

4. Identify the following diagram and write its function.



The figure shows the lightning conductor. It is used to protect building and houses from lightning.

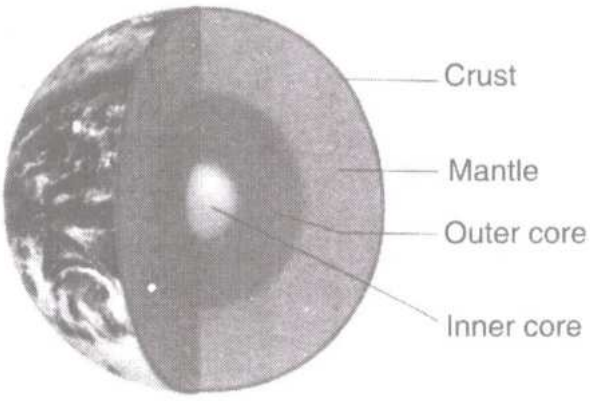
5. Draw a diagram of the earth to show internal structure of earth and answer the following questions.

(i) Name the three layers of earth.

(ii) Name the layer on which we live.

(iii) Which is the largest layer of earth?

(iv) In which layer of earth tremors of earthquakes occur?



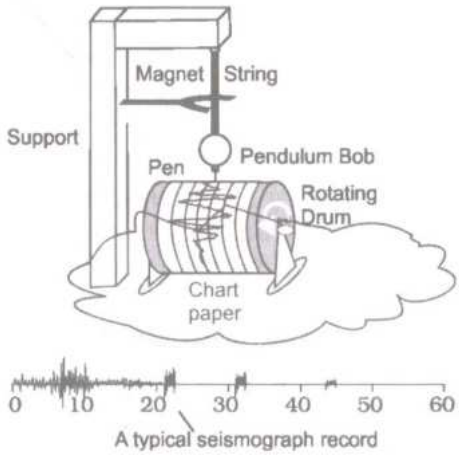
(i) There are following three layers of earth : Crust , Mantle and core

(ii) We live on crust.

(iii) Core is the largest layer.

(iv) Tremors occur in earth's crust.

6. Draw a diagram of seismograph. Which scale is used to measure earthquake?



The Richter Scale is used to measure the intensity of earthquake

7. Draw a diagram of lighting conductor.