12
Chapter

Some Natural Phenomena

We'll cover the following key points:

- Story of Charge
- Lightning
- Earthquake

Hi, I'm EeeBee

Do you Remember:

Fundamental concept in previous class.

In class 5th we learnt

- Earthquakes

Still curious? Talk to me by scanning the QR code.

Learning Outcomes

By the end of this chapter, students will:

- Understand lightning during thunderstorms and safety precautions.
- Learn about lightning conductors and their role in protection.
- Explore earthquakes, their causes, and tectonic plate movements.
- Identify safety measures to minimize earthquake damage and assess risks.

Guidelines for Teachers

To ensure effective learning, teachers can:

- Relate natural disasters like lightning and earthquakes to real-life scenarios.
- Use videos and simulations to simplify complex concepts.
- Teach essential safety practices for emergencies.
- Encourage discussions to develop critical thinking and problem-solving skills.

NCF Curricular Goals and Competencies

This chapter aligns with:

- CG-6 (C 6.1): Encouraging the study of natural processes through observation, experimentation, and critical thinking while fostering an understanding of scientific phenomena.

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Mind Map

SOME NATURAL PHENOMENA

Charging by Rubbing, Its Types and their Interaction

Rubbing plastic refill with polythene and plastic comb with dry hair creates electric charges on the objects, making them charged. Polythene and hair also become charged in the process.

Types: positive and negative charges.

Note :- Like charges repel each other and unlike charges attract each other.

Lightning & its Story

Lightning is the spark of electricity which we see in clouds.

Changing clothes in the dark created sparks.

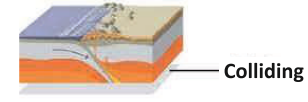
In 1752, Benjamin Franklin demonstrated that lightning is a form of electricity by flying a kite during a thunderstorm. He attached a metal key to the string, which conducted electricity and produced sparks, proving the link between lightning and electrical charges.

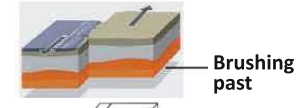
Earthquake

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

Causes of Earthquakes

- By the movement of tectonic plates.
- Magnitude measured on the Richter Scale.

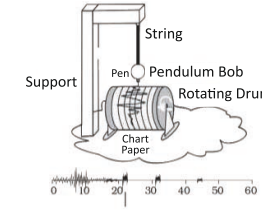




A Seismograph

A seismograph is a device used to measure and record the intensity of an earthquake.

- **It consists of:**
  - A pendulum bob to detect ground motion.
  - A rotating drum with chart paper for recording seismic waves.



Protection Against Earthquakes

Before:

a. Secure heavy furniture.
b. Prepare an emergency kit.
c. Identify safe spots.

During:

a. Take cover under sturdy furniture.

Transfer of Charge

Electroscope: Aluminum foil strips charged by a refill through a paper clip repel each other, indicating charge presence. This is an electroscope, used for charge testing.

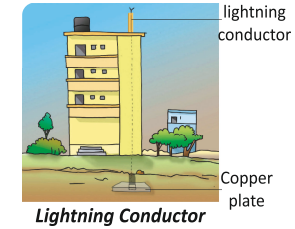
Earthing.: The process of transferring of charge from a charged object to the earth is called earthing.

Lightning Safety

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 of the safe place

Lightning Conductors: Lightning Conductor is a device used to protect buildings from the effect of lightning.

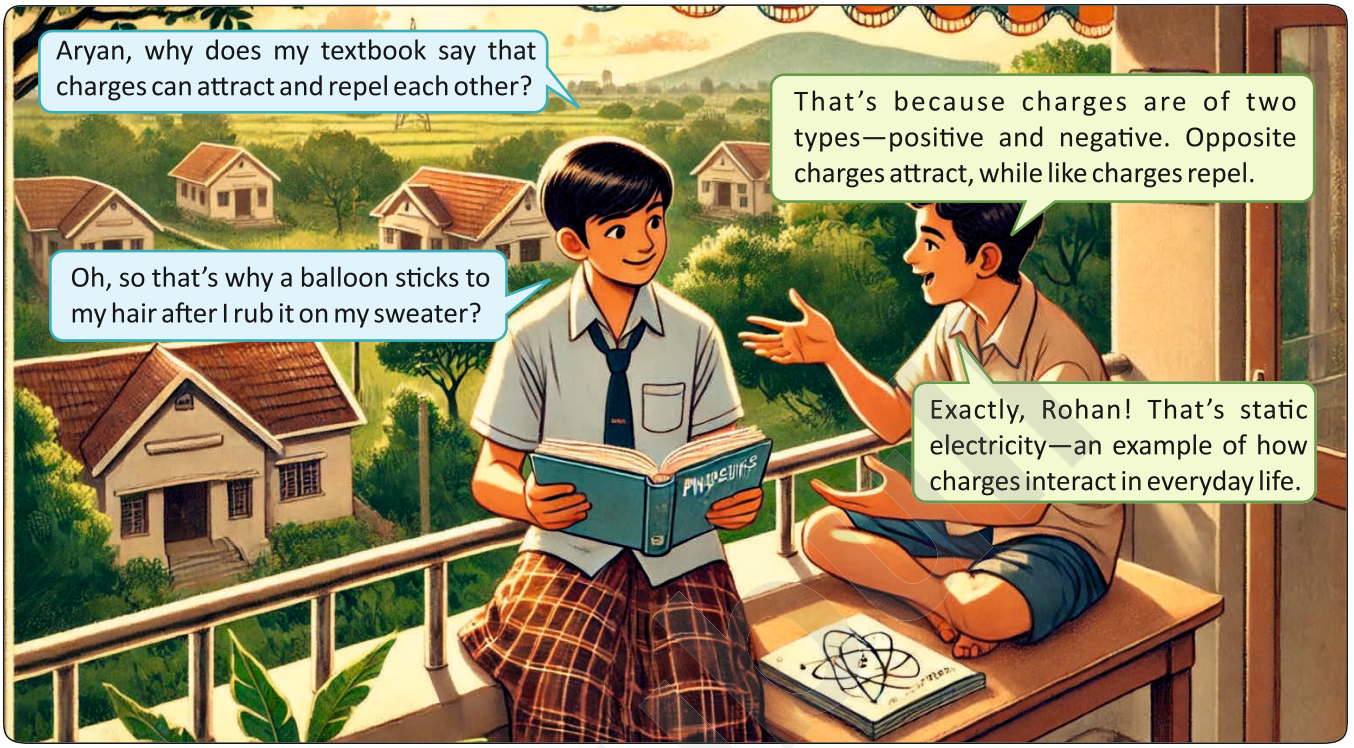


Lightning Conductor

Based on NCERT*

Story of Charge

One afternoon, Rohan was sitting on the balcony reading his physics book when his cousin Aryan joined him.



In History...

In the 19th century, scientists like Benjamin Franklin and Michael Faraday made groundbreaking contributions to understanding natural phenomena such as electricity and lightning. Franklin's famous kite experiment in 1752 demonstrated the electrical nature of lightning, while Faraday's work in the 1830s laid the foundation for understanding electromagnetic fields and their role in natural forces. These discoveries helped shape our understanding of how forces like electricity, magnetism, and light interact with the natural world.

Introduction

Let us recall some of the sparking phenomena which you might have often seen.

- When you take off woollen or polyester clothes, your hair stands on ends. If you take off these clothes in the dark, you see even a spark and hear crackling sound.
- Sparking from a loose electric plug in the socket.
- Sparking of loose electric wires on the electric poles when wind is blowing and shaking the wires

All these are sparking phenomena. Lightning is also a sparking phenomenon on a large scale. In 1752 Benjamin Franklin, an American scientist, showed that lightning and the spark from your clothes are essentially the same phenomena. However, this realisation took 2000 years.

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

In order to understand lightning, we first need to understand the basics of electric charge.

Charging by Rubbing

The ancient Greeks knew as early as 600 B.C. that when amber (amber is a kind of resin) is rubbed with fur, it attracts light objects such as hair. To understand this, let us perform the following activities:

Activity

Take a used ball pen refill and rub it vigorously with a piece of polythene. Bring it close to small pieces of paper. Take care not to touch the rubbed end of the refill with your hand or with a metallic object. Repeat the activity with small pieces of dry leaf, husk and mustard seeds. You will see that the ball pen refill attracts the small piece of paper, dry leaf, husk and mustard seeds.

In fact, 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 process of charging the refill and the plastic comb, polythene and hair also get charged. Let's try to charge some other objects that are familiar to you.

Activity

Collect the objects and the materials listed in. Try to charge each by rubbing with the materials mentioned in the Table. Record your findings. You can add more items to the Table.

Objects Rubbed	Materials used for rubbing	Attracts/ does not attract pieces of paper	Charged/ not charged
Refill	Polythene, woollen cloth		
Balloon	Polythene, woollen cloth, dry hair		
Eraser	Wool		
Steel spoon	Polythene, woollen cloth		

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Types of Charges and Their Interaction

We will select some objects from table of our last activity for the next activity.

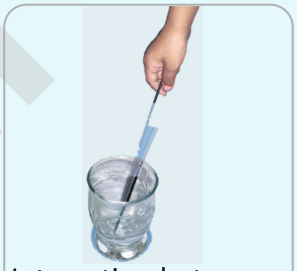
Activity

(a) Inflate two balloons. Hang them in such a way that they do not touch each other. Rub both the balloons with a woollen cloth and release them. What do you observe?

- Now let us repeat this activity with the used pen refills. Rub one refill with polythene. Place it carefully in a glass tumbler using the tumbler as a stand.
- Rub the other refill also with polythene. Bring it close to the charged refill. Be careful not to touch the charged end with your hand. Is there any effect on the refill in the tumbler? Do the two attract each other, or repel each other?
- In this activity we have brought close together the charged objects that were made of the same material. What happens if two charged objects made of different materials are brought close to each other? Let's find out.

(b) Rub a refill and place it gently in a glass tumbler as before. Bring an inflated charged balloon near the refill and observe.

Like charges repel each other



Interaction between like charges

Unlike charges attract each other

Let's summarise the observations:

- A charged balloon repelled a charged balloon.
- A charged refill repelled a charged refill.
- But a charged balloon attracted a charged refill.

The above observations clearly indicate that:

- The charge on the balloon is of a different kind from the charge on the refill. Thus, we can say that there are two kinds of charges.
- 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 as positive. The other kind of charge is said to be negative.

It is now clear that :

- Two positively charged objects repel each other.
- Two negatively charged objects repel each other.
- A positively charged object attracts a negatively charged object.

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Thus, finally it can be said that like charges repel each other, while unlike charges attract each other.

The electrical charges generated by rubbing are static. They do not move by themselves. When charges move, they constitute an electric current. You have been reading about electric current since Class VI. The current in a circuit which makes a bulb glow, or the current that makes a wire hot, is nothing but a motion of charges.

Equal and Opposite Charges

When a glass rod is rubbed with silk, the glass rod acquires a positive charge and at the same time, the silk cloth acquires the equal amount of negative charge. Similarly, when ebonite is rubbed with wool, the ebonite acquires a negative charge and at the same time the wool acquires the equal amount of positive charge. Thus, when two bodies are charged by rubbing against each other, they acquire equal and opposite charges.

Testing charge on a body

We have seen that a charged body attracts another charged body having opposite charge. A charged body also attracts an uncharged body, for example, the charged comb attracts the pieces of papers and husk which are not charged. Therefore, attraction by a charged body does not indicate whether the other body is also charged or not. However, if the body being tested is repelled by a charged body, you are certain that it is charged. It has the same charge as on the charged body. Therefore, to test if a body is charged or not, bring near it a positively charged body and a negatively charged body, one by one. If it is:

- Attracted by both, it has no charge.
- Repelled by the positively charged body, it is also positively charged.
- Repelled by the negatively charged body, it is also negatively charged.

Thus, repulsion alone is a sure test of charged body.

Origin of Electric Charge on a Body

Atoms are the ultimate constituent particles of any substance and atoms contain equal numbers of positive charge (protons) and negative charge (electrons) on them and as such the atoms remain neutral because the positive and negative charges neutralise each other. The positive charge, i.e., protons are firmly bound to the atoms while the negative charge, i.e. electrons are loosely bound. In the process of rubbing, some of the electrons get transferred from one body to another and the bodies get charged.

- When a glass rod is rubbed with silk cloth, some of the electrons from the glass rod move to the silk cloth. Thus, the silk cloth becomes negatively charged due to excess of electrons and the glass rod becomes positively charged due to lesser number of electrons.
- When ebonite rod is rubbed with wool, some of the electrons from wool move to the ebonite rod. Thus, ebonite rod becomes negatively charged due to excess of electrons and the wool becomes positively charged due to lesser number of electrons.

Different Ways of Charging a Body

Charging by Induction

When a body gets charged simply by bringing it near a charged body, then this method of charging is called charging by induction.

Charging by Conduction

If an object gets charged when it comes in contact with a charged object, then this method of charging is called charging by conduction. The object acquires the same charge as that on the charged object.

Charging by Rubbing or Charging by Friction

You know that when two objects are rubbed against each other they get charged. For example, when a glass rod is rubbed with silk, the glass rod acquires positive charge and silk cloth acquires negative charge.

Activity

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. Cut two strips of aluminum foil about 4 cm × 1 cm each. Hang them on the paper clip as shown. Insert the paper clip in the cardboard lid, so that it is perpendicular to it. Charge a refill and touch it with the end of the paper clip. Observe what happens. Is there any effect on the foil strips? Do they repel each other or attract each other? Touch now, other charged bodies with the end of the paper clip. Do foil strips behave in the same way in all cases? Can this apparatus be used to detect whether a body is charged or not? Can you explain why the foil strips repel each other?

A simple electroscope

KEYWORDS

Charging by Rubbing: The process of transferring electric charge between two objects through direct contact and friction, leading to one object gaining a positive charge and the other a negative charge.

Charging by Friction: A method of charging an object by rubbing it against another material, which causes electrons to move from one object to another, resulting in static electricity.

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Let's recall what we know

Apply Concept in Real-Life Context

Apply

1. Why do you think a balloon sticks to a wall after being rubbed on your hair?
2. When you comb your hair with a plastic comb, why do small pieces of paper get attracted to it?

Skills Covered: Critical and logical thinking, Identification, Application thinking

Further Analysis

Analyse

1. Explain the difference between positive and negative charges. How do they interact with each other?
2. Why do charged objects sometimes lose their charge over time?

Skills Covered: Critical analysis, logical reasoning, brainstorming

Self-Assessment Questions

Evaluate

1. What is an electric charge? Give an example of an object that can be charged.
2. Explain the concept of attraction and repulsion between charges with examples.
3. What is static electricity, and how is it different from current electricity?
4. Name two materials that can be easily charged and two that cannot. Explain why.

Creative Task

Create

Conduct an experiment to understand how static electricity works:

1. Take a plastic ruler and rub it on a woolen cloth.
2. Bring the ruler near small pieces of paper or your hair.
3. Observe what happens when the ruler interacts with the paper or hair.

Write your observations and conclusions in your notebook, explaining same as an a activity, how static electricity is generated and its effect.

Skills Covered: Brainstorming, research, digital literacy, creativity

Bloom's Taxonomy

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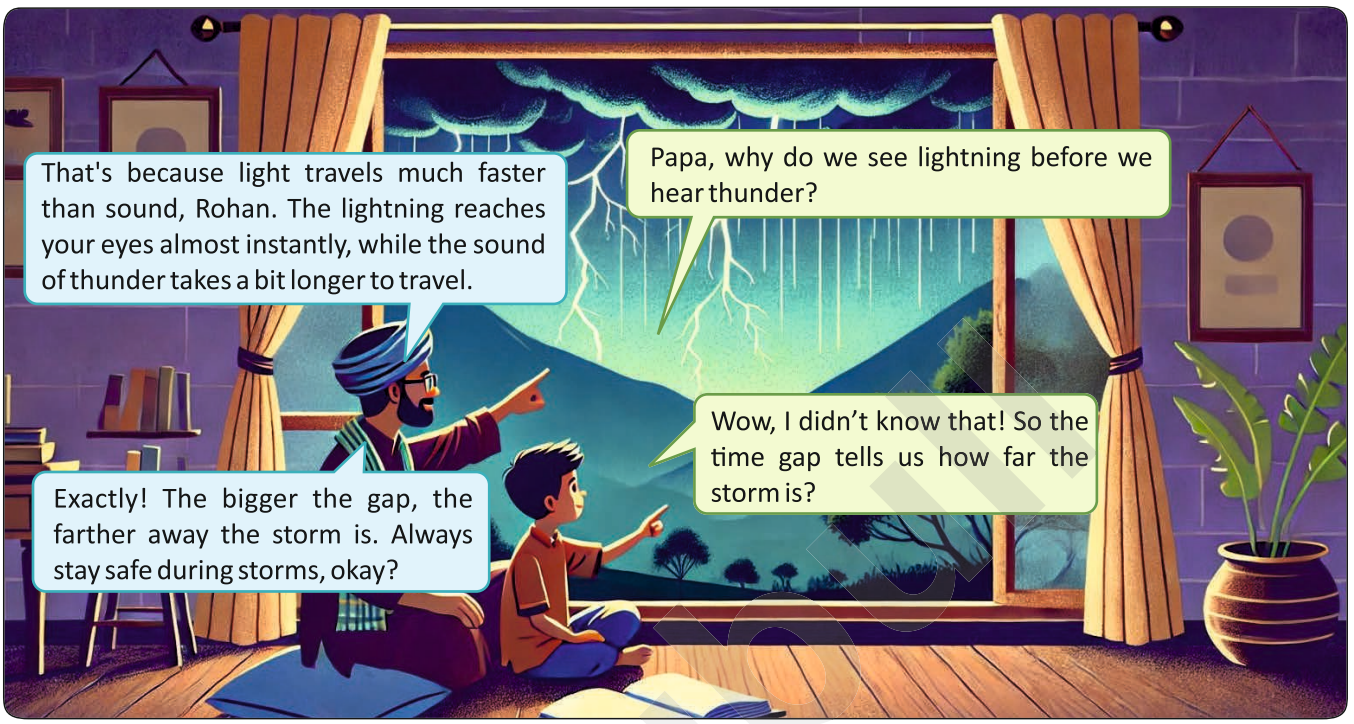
Lightning

One evening, Rohan was looking out of the window during a thunderstorm when his father, Arun, walked into the room.

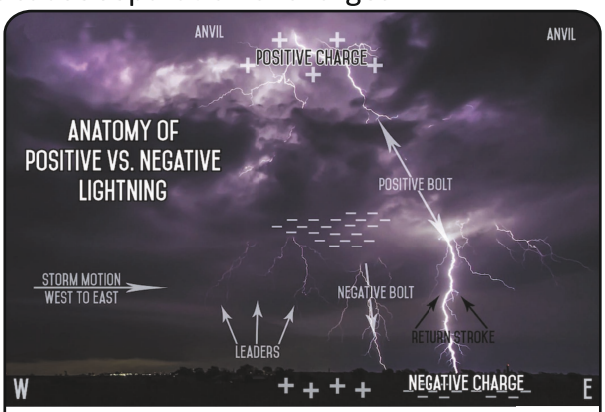


The Story of Lightning

It is now possible to explain lightning in terms of the charges produced by rubbing.

During the development of a thunderstorm, the air currents move upward while the water droplets move downward. These vigorous movements cause separation of charges.

By a process, not yet completely understood, the positive charges collect near the upper edges of the clouds and the negative charges accumulate near the lower edges. There is accumulation of positive charges near the ground also. When the magnitude of the accumulated charges becomes very large, the air which is normally a poor conductor of electricity, is no longer able to resist their flow. Negative and positive charges meet, producing streaks of bright light and sound. We see streaks as lightning. The process is called an **electric discharge**.



Accumulation of charges leading to lightning

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 basic phenomenon. Scientists are trying hard to improve our understanding. However, lightning strike could destroy life and property.

Lightning Safety

During lightning and thunderstorm no open place is safe.

- Hearing thunder is an alert to rush to a safer place.
- After hearing the last thunder, wait for some time before coming out of the safe place.

Finding a safe place

A house or a building is a safe place. If you are travelling by car or by bus, you are safe inside with windows and doors of the vehicle shut.

Do's and Don'ts During a Thunderstorm

Outside The House

Open vehicles like motorbikes, tractors, construction machinery, open cars are not safe. Open fields, tall trees, shelters in parks, elevated places do not protect us from lightning strokes.

Carrying umbrella is not a good idea at all during thunderstorms.

If, in a forest, take shelter under shorter trees.

If no shelter is available and you are in an open field, stay far away from all trees. Stay away from poles or other metal objects. Do not lie on the ground. Instead, squat low on the ground. Place your hands on your knees with your head between the hands. This position will make you the smallest target to be struck

Safe position during lightning

Inside the house

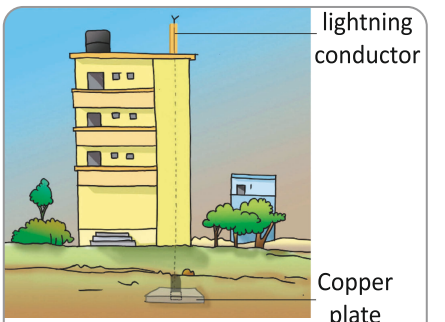
Lightning can strike telephone cords, electrical wires and metal pipes. Do you remember, lightning is an electrical discharge? During a thunderstorm contact with these should be avoided. It is safer to use mobile phones and cordless phones. However, it is not wise to call up a person who is receiving your phone through a wired phone.

Bathing should be avoided during thunderstorms to avoid contact with running water.

Electrical appliances like computers, TVs, etc. should be unplugged. Electrical lights can remain on. They do not cause any harm.

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. The rod provides easy route for the transfer of electric charge to the ground.



Lightning Conductor

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

Let's recall what we know

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Take a Task

Watch Remedial

Apply Concept in Real-Life Context

Apply

1. Why do you think lightning strikes are more common during thunderstorms?
2. Why is it advised to stay indoors or avoid tall objects during a lightning storm?

Skills Covered: Critical and logical thinking, Identification, Application thinking

Further Analysis

Analyse

1. Explain how lightning is formed in the clouds and what causes its sudden discharge to the ground.
2. Why do some objects conduct lightning while others do not? Give examples of conductors and insulators.

Skills Covered: Critical analysis, logical reasoning, brainstorming

Self-Assessment Questions

Evaluate

1. What is lightning, and how is it related to electric charges?
2. What safety measures should you take during a lightning storm?
3. Explain the role of positive and negative charges in the formation of lightning.
4. What is the difference between a lightning conductor and a regular object during a lightning strike?

Creative Task

Create

Design a simple experiment to understand static electricity, which is similar to the principle behind lightning;

1. Take a plastic ruler and rub it on your dry hair for a few seconds.
2. Bring the ruler close to small pieces of paper.
3. Observe how the paper is attracted to the ruler due to static electricity.

Write your observations and connect them to how lightning forms in nature due to the buildup and discharge of electric charges.

Skills Covered: Brainstorming, research, digital literacy, creativity

Bloom's Taxonomy

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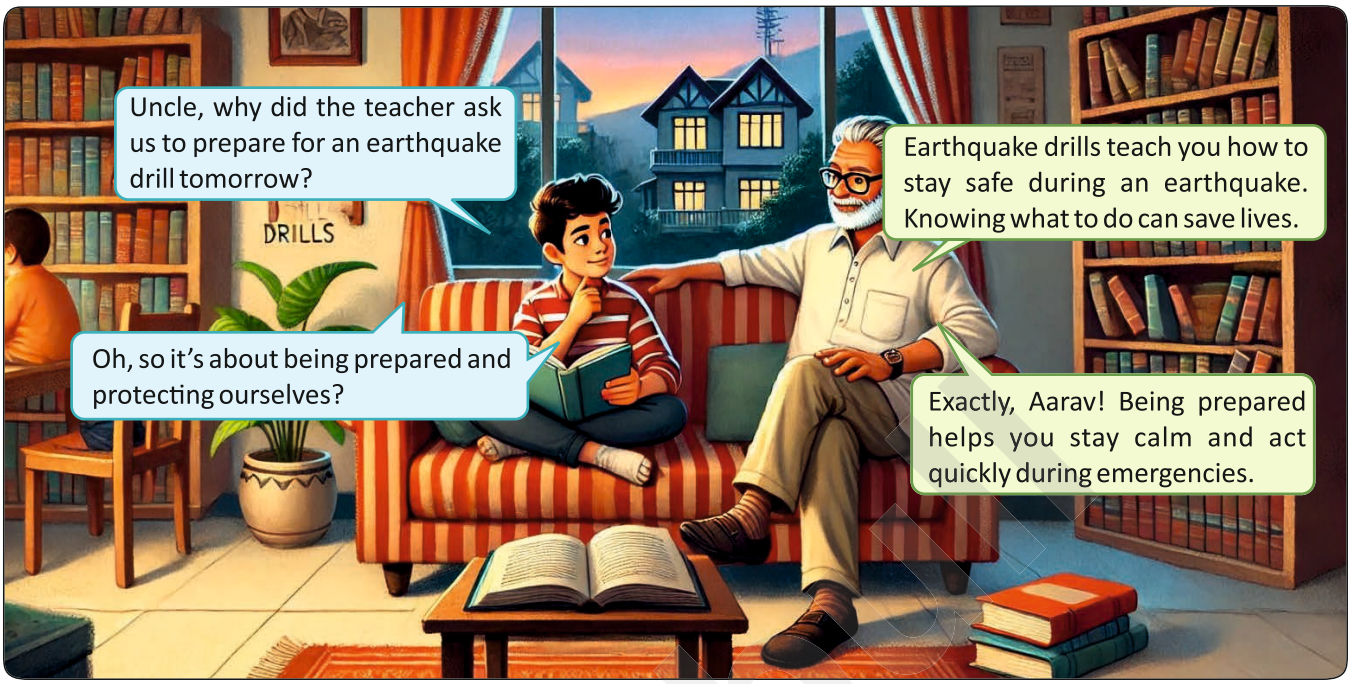
Earthquake

Aarav is reading in the living room when his uncle, Rohan, joins him.



Introduction

An earthquake is a natural phenomenon that causes sudden trembling or shaking of the earth due to disturbance under the earth's surface. It is caused by disturbances deep inside the earth's crust. Earthquakes can cause large-scale destruction including loss of life and property. Earthquakes may sometimes give rise to tsunamis, which may sweep across coastal areas causing destruction. The study of earthquakes is called **seismology**.

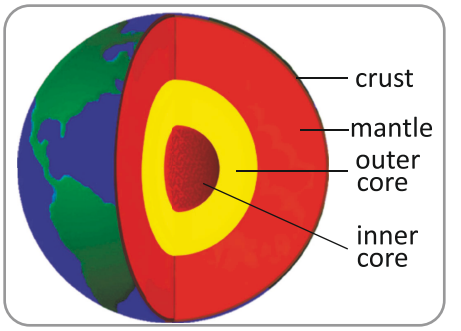
A building damaged by an earthquake

Richter scale

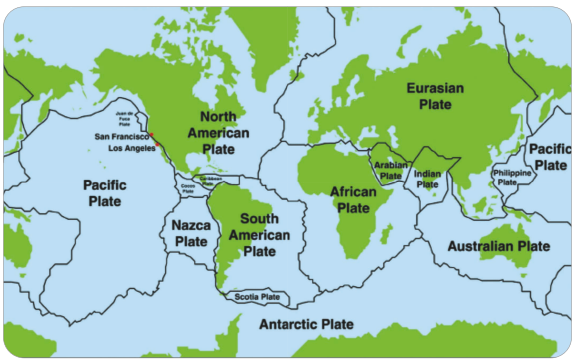
The magnitude or intensity of an earthquake is measured by Richter scale. This scale was developed in 1935 by Charles F Richter, a US seismologist. Really destructive earthquakes have magnitudes higher than 7 on the Richter scale. Both Bhuj and Kashmir earthquakes had magnitudes greater than 7.5.

Causes of earthquakes

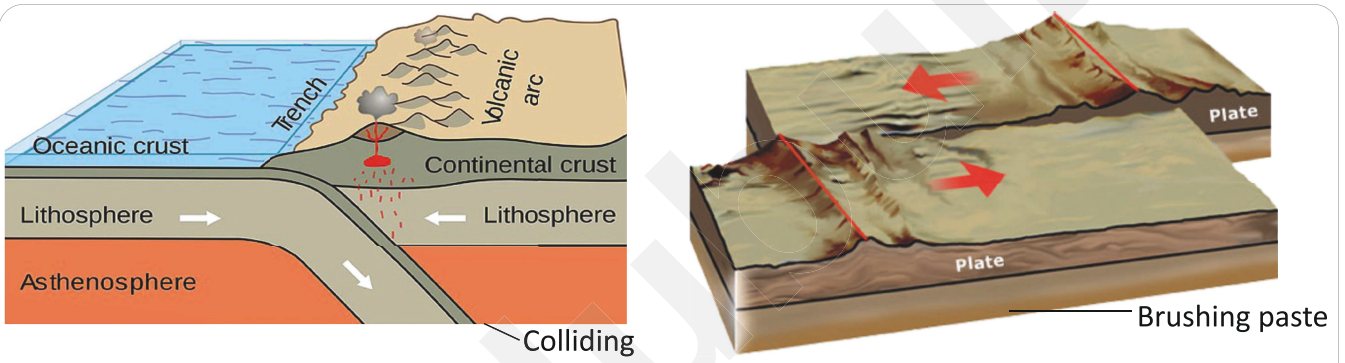
Now we know that the tremors are caused by the disturbance deep down inside the uppermost layer of the earth called the crust.



The outermost layer of the earth is not in 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 in the earth's crust. It is this disturbance that shows up as an earthquake on the surface of the earth.



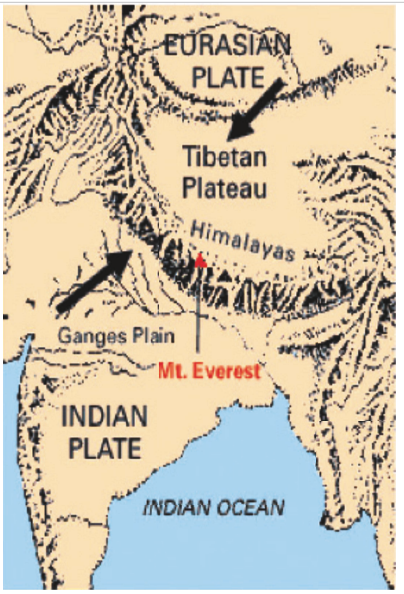
Movements of earth's plates

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 earth's plates.

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

Seismic zones

Since earthquakes are caused by the movement of plates, the boundaries of the plates are the 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.



Movements of Indian earth's plates

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 withstand major tremors. Modern building technology can make it possible.

It is advisable to make the structure simple so that it is 'Quake Safe'.

- It is better if the cupboards and shelves are fixed to the walls, so that they do not fall easily.
- Consult qualified architects and structural engineers.
- In highly seismic areas, the use of mud or timber is better than the heavy construction material. Keep roofs as light as possible. In case the structure falls, the damage will not be heavy.
- 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.
- 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.

The Central Building Research Institute, Roorkee, has developed - know how to make quake proof houses. In the event that an earthquake does strike, take the following steps to protect yourself:

1. If you are at home :

- If you are in bed, do not get up. Protect your head with a pillow.
- Stay away from tall and heavy objects that may fall on you.
- Take shelter under a table and stay there till shaking stops.

2. If you are outdoors :

- If you are in a car or a bus, do not come out. Ask the driver to drive slowly to a clear spot. Do not come out till the tremors stop.
- Find a clear spot, away from buildings, trees and overhead power lines. Drop to the ground.

KEYWORDS

Seismic Areas: Regions that are prone to earthquakes or seismic activity due to tectonic plate movements or other geological factors.

Timber: Wood that is processed and used for construction, furniture making, or other purposes.

Tremors: Small, often minor, seismic vibrations or shaking of the ground, typically caused by earthquakes or volcanic activity.

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Let's recall what we know

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Take a Task

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Apply Concept in Real-Life Context

Apply

1. Why do you think buildings in earthquake-prone areas are more likely to collapse if not designed properly?
2. When an earthquake occurs, why do we feel the ground shaking even if we are far from the epicenter?

Skills Covered: Critical and logical thinking, Identification, Application thinking

Further Analysis

Analyse

1. Explain how the magnitude and intensity of an earthquake affect its impact on the environment and human life. Provide examples.
2. Why are some areas more prone to earthquakes than others? Discuss the role of tectonic plates.

Skills Covered: Critical analysis, logical reasoning, brainstorming

Self-Assessment Questions

Evaluate

1. What is an earthquake, and what causes it?
2. Define the terms epicenter, focus, and seismic waves.
3. How do tectonic plate movements contribute to the occurrence of earthquakes?
4. List two safety measures that can be taken during an earthquake to minimize risks.

Creative Task

Create

Create a simple model or diagram to explain how tectonic plates move and cause earthquakes.

1. Use clay or cardboard to represent tectonic plates.
2. Demonstrate how the plates slide, collide, or move apart to show different types of plate boundaries.

Write a brief explanation of how these movements lead to earthquakes, including examples of regions where each type of plate movement occurs.

Skills Covered: Brainstorming, research, digital literacy, creativity

Bloom's Taxonomy

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SUMMARY

1. The Story of Charge

What is Charge?

Charge is a fundamental property of matter, present in all objects, and is responsible for the forces that hold atoms and molecules together. It is categorized into two types: positive and negative, where like charges repel and opposite charges attract.

How Charges Interact

Charged objects interact through electric fields, which are invisible forces that extend around the object. These interactions are the basis for phenomena like static electricity.

- **Static Electricity and Everyday Life:** Static electricity occurs when charges build up on an object due to friction, like rubbing a balloon on hair or walking on a carpet.
- **The Role of Charge in Nature:** Charge is essential in natural events like lightning and in modern applications like electricity generation and electronics.

2. Lightning

What Causes Lightning?

Lightning is an electrical discharge caused by the buildup of static electricity in storm clouds. Inside the cloud, collisions between water droplets, ice crystals, and particles generate static charges, separating positive charges at the top and negative charges at the bottom.

The Discharge Process

When the charge difference between the cloud and the ground (or between clouds) becomes too great, the air becomes a conductor, leading to a massive discharge of electricity—lightning.

- **Lightning Strikes the Ground:** Lightning often strikes the tallest objects because they provide the shortest path for the charge to reach the ground. However, it can still strike anywhere unexpectedly.
- **Safety During Lightning:** To stay safe, avoid open fields, tall objects, and water. Take shelter in buildings or vehicles, and avoid using electronic devices or plumbing during a storm.

3. Earthquake

What is an Earthquake?

An earthquake is the shaking of the Earth's surface caused by the sudden release of energy in the Earth's crust. This energy is usually the result of stress building up from movements of tectonic plates.

The Cause: Tectonics Plate

The Earth's crust is divided into tectonic plates that float on the molten mantle. These plates interact at boundaries, leading to stress and eventual release in the form of seismic waves.

Effects of Earthquakes

Earthquakes can cause significant damage, including collapsing buildings, landslides, and tsunamis. The extent of damage depends on the earthquake's magnitude, depth, and proximity to populated areas.

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Gap Analyzer™
Take a Test

EXERCISE

That turn curiosity into confidence—let's begin!

A. Choose the correct answer.

1. What causes the buildup of electric charge during a thunderstorm?
   (a) Rainfall ☐ (b) Strong winds ☐
   (c) Friction between water droplets and air ☐
   (d) The Earth's magnetic field ☐
2. Which device is used to protect buildings from lightning?
   (a) Circuit breaker ☐ (b) Lightning conductor ☐
   (c) Voltage regulator ☐ (d) Surge protector ☐
3. What is the scale used to measure the magnitude of an earthquake?
   (a) Richter scale ☐ (b) Barometer ☐
   (c) Seismograph ☐ (d) Mercalli scale ☐
4. Which layer of the Earth is responsible for tectonic activity?
   (a) Crust ☐ (b) Mantle ☐
   (c) Core ☐ (d) Lithosphere ☐
5. Which of the following natural phenomena is caused by electric charges?
   (a) Earthquake ☐ (b) Lightning ☐
   (c) Volcanic eruption ☐ (d) Cyclone ☐

B. Fill in the blanks.

1. The sudden flow of electric charges during a thunderstorm is called _____.
2. _____ is a safety measure installed in buildings to direct lightning safely to the ground.
3. The instrument used to detect and record seismic waves is called a _____.
4. An earthquake is caused by the sudden movement of _____ plates.

C. Write True or False.

1. Lightning is caused by the movement of positive and negative charges in the clouds. _____
2. The Richter scale measures the intensity of damage caused by an earthquake. _____
3. The Earth's crust is broken into large pieces called tectonic plates. _____
4. Lightning strikes only occur over land, not over water. _____

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D. Define the following terms.

1. Electric charge
2. Lightning conductor
3. Earthquake focus
4. Seismograph
5. Tectonic plate

E. Match the columns.

Column A	Column B
1. Lightning conductor	(a) Tectonic activity
2. Richter scale	(b) Directs charge safely to the ground
3. Seismograph	(c) Measures earthquake magnitude
4. Tectonic plate movement	(d) Device for detecting seismic waves
5. Epicenter	(e) Point on Earth's surface above the earthquake focus

F. Give reasons for the following statements.

1. Lightning is more likely to strike tall buildings or trees.
2. Safety drills are conducted in earthquake-prone areas.
3. Lightning conductors are installed on skyscrapers.
4. Earthquakes are more frequent along tectonic plate boundaries.
5. Rubber-soled shoes are recommended during lightning storms.

G. Answer in brief.

1. Explain how lightning occurs during a thunderstorm.
2. What safety measures should be taken during an earthquake?
3. What is the significance of a lightning conductor?
4. Why does the Earth's crust experience tectonic activity?
5. What are aftershocks, and how do they occur after an earthquake?

H. Answer in detail.

1. Explain the phenomenon of lightning, including the role of electric charges.
2. Describe how an earthquake occurs, highlighting the roles of tectonic plates and faults.
3. Discuss the safety precautions to be taken during lightning and earthquakes.
4. Explain how a seismograph works and its role in measuring earthquake activity.
5. What is the importance of understanding plate tectonics in predicting earthquakes?

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NEP Corner

Know about NEP 2020

Focus on Mental Health!

NEP promotes wellness programs to support emotional and mental well - being.

Skill-based Activity

Activity

STEM

1. Explain the concept of static electricity and how it is produced.
2. Create a chart differentiating between positive and negative charges, along with their behaviors.
3. Reflect on how the understanding of electric charges is applied in everyday technologies, such as photocopiers or air purifiers.

Skills Developed: Observation, Creativity, Logical Reasoning, Reflective Thinking, Practical Application

Understanding Lightning and Safety

Visualize

1. Research how lightning is formed in clouds and explain the role of electric charges in this phenomenon.
2. Create a flowchart to show the process of lightning formation.
3. Discuss how lightning rods work to protect buildings and structures from lightning strikes.

Skills Covered: Creativity, Imagination, Problem-solving, Environmental Awareness

Natural Phenomena in Nature

Group Activity

1. Investigate how natural phenomena like lightning, earthquakes, and volcanic eruptions occur.
2. Create a model or presentation to explain the processes behind one natural phenomenon of your choice.
3. Share your findings with the class through a creative medium, such as a skit, model, or video.

Skills Covered: Critical thinking, Planning, Collaboration, Communication, Creativity, Teamwork

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Earthquakes: Causes and Effects

Case to Investigate

1. Research the causes of earthquakes and classify them as tectonic, volcanic, or man-made.
2. Write a brief report on the impact of a recent earthquake, focusing on the damage caused to life and property.
3. Create an infographic explaining how seismic waves travel through the Earth during an earthquake.
4. Suggest ways to minimize the destruction caused by earthquakes, such as improved building designs and emergency preparedness.

Skills Covered: Observation, Critical thinking, Research, Analytical skills, Communication

Managing Natural Phenomena

Aligning with SDGs

1. Write about how knowledge of natural phenomena like lightning or earthquakes has helped communities prepare better for these events.
2. Identify measures taken to ensure safety during these events, such as the use of lightning rods, early warning systems, or earthquake-resistant designs.
3. Create a visual representation or mind map of how understanding these phenomena supports sustainable development.

Align these efforts with SDGs:

SDG 9: Building resilient infrastructure to withstand earthquakes.,SDG 11: Creating sustainable and disaster-resilient cities and communities., SDG 13: Taking climate action to reduce human-induced risks that worsen natural phenomena., SDG 3: Promoting health and well-being by reducing disaster-related injuries and fatalities.

Skills Covered: Research, Brainstorming, Problem-solving, Presentation skills

Applications of Knowledge about Natural Phenomena

Integrated Learning

1. Research how earthquake-resistant buildings are designed using concepts of force and pressure.
2. Identify and explain the role of surge protectors in preventing damage caused by lightning to electrical appliances.
3. Design a simple model to demonstrate how seismic waves travel or how charges move during lightning.
4. Discuss how advancements in understanding natural phenomena have improved disaster management and infrastructure.

Integrated Learning: Environmental Science

Skills Covered: Brainstorming, Research, Investigation, Critical Thinking

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