Revision Notes for Class 8 Science

Chapter 12 – Some Natural Phenomena

Lightning and Earthquake

Lighting

Lightning is an electrical discharge or an electrical spark that occurs in nature. This is caused by the accumulation of charges in the clouds. It can be deadly, and it can lead to the loss of life and property. In ancient times people were unsure of the source of the lightning, and so they were scared of it. Some measures that can help us prepare and defend ourselves from this natural phenomenon have been developed by scientists nowadays.

Charging by Rubbing

Objects get charged due to a transfer of electrons between them when we rub two objects with each other. For example, if we rub a rubber balloon with animal fur, the balloon made of rubber attracts the electrons from the animal fur. This results in rubber having an excess of electrons while the fur has a lack of electrons. In the same way, if we rub a plastic comb with dry hair, the comb gets some charge.

Types of Charges and Their Interaction

Types of Charges: There are two types of electric charges:

- **Positive Charge:** Results from a deficiency of electrons. Objects with a positive charge have more protons than electrons.
- **Negative Charge:** Results from an excess of electrons. Objects with a negative charge have more electrons than protons.

Like Charges Repel: Objects with the same type of charge (both positive or both negative) repel each other. This means that two positively charged objects or two negatively charged objects will push away from each other.

Unlike Charges Attract: Objects with opposite charges (one positive and one negative) attract each other. A positively charged object will attract a negatively charged object and vice versa.

Charge Conservation: The total amount of electric charge in an isolated system remains constant. Charges cannot be created or destroyed, only transferred from one object to another.

Interaction Examples:

- **Electrostatic Attraction:** When a balloon rubbed on your hair sticks to a wall, it's because the balloon has a negative charge and the wall, being neutral or slightly positive, attracts it.
- **Electrostatic Repulsion:** When you rub two balloons with the same material and try to bring them close, they repel each other because both balloons have the same type of charge.

Transfer of Charge

- The aluminium foil strips in an electroscope receive the same charge from a charged refill via a paper clip, causing them to repel each other and spread out.
- This device helps determine if an object carries a charge. If the foil strips are repelled, it indicates that the object is charged.
- When you touch the paper clip with your hand, the foil strips collapse because they lose their charge to the earth through your body.
- Repeatedly charging the foil strips and then touching the paper clip will cause the strips to collapse each time due to the loss of charge.
- The process of transferring charge from a charged object to the earth through a conductor (like your body) is known as earthing.

Electroscope

It is a system that can measure whether or not an object is charged. Generally, gold and silver are used to create an electroscope because they are strong conductors of electricity. Otherwise, copper and aluminium can also be used. It consists of a glass jar with a vertical brass bar. The rod is inserted through the cork into the pot. The brass rod has a disk or a horizontal rod fixed to it. Two leaves of gold are suspended from the other end.

The Story of Lightning

In a thunderstorm, moving air and water droplets cause charges to separate, with positive charges at the top of clouds, negative at the bottom, and additional positive charges on the ground. When these charges build up too much, they discharge as lightning, creating bright streaks and thunder. Lightning can occur between clouds or between clouds and the ground. Though we now understand lightning better, it remains dangerous, so taking safety precautions is essential.

Lightning Safety

The Lightning Safety are:

- Avoid open areas and move to a safe place like a building or a vehicle with closed windows.
- Open vehicles and tall trees are unsafe during thunderstorms.
- If no shelter is available, stay low and away from metal objects.
- Inside, avoid touching electrical wires and metal pipes; use mobile phones instead.
- Unplug electrical appliances if possible, but it's safe to keep lights on.
- Lightning conductors protect buildings by directing lightning safely to the ground.

Earthquakes

Earthquake is the sudden shaking of the earth for a short time, caused by a movement deep within the surface of the earth. Internally, four layers, the crust, mantle, outer core, and inner core, make up the earth. The crust is not a single piece that protects the inner layers. In smaller plates, it is fragmented. Such plates are in constant movement. A disruption is felt in the crust each time they collide with each other or go above/ below the other. This collision causes an earthquake.

The magnitude of the earthquake is measured on the Richter scale. The scale is based on the amount of loss of life and property that an earthquake can cause. The higher the magnitude of the earthquake on this scale, the more damage it will cause. Scientists have also devised an instrument called the Seismograph, which records the waves created by the tremors on the surface of the earth. This helps them estimate their ability to cause damage.

Earthquakes Can Lead to:

- Loss of life
- Loss of property such as buildings, dams, and bridges
- Floods
- Landslides
- Tsunamis

Seismograph

The seismograph is an instrument that can record seismic waves. It includes a metal rod or a pendulum that can vibrate when the earthquake happens. The metal rod is attached to a pen that records the waves on the paper. Scientists study these waves and then create a map of the earthquake. This also helps them assess the strength of the earthquake.

Precautions for Earthquakes

Some of the precautions to take beforehand:

- Develop houses that are quake-resistant.
- Use wood and mud instead of cement and steel to minimize damage.
- The cupboards and shelves are to be attached to the wall.
- Reduce the number of items that are hanging in your building.
- Keep fire extinguishers handy at all times.

Here are Some of the Precautions to Take During an Earthquake

- If you're out, stay away from houses, trees, and power lines. Stay low to the ground.
- If you're at home, sit down under a large table or bed. Keep away from objects that could collapse in case the tremor increases.

Some Dos and Don’ts during a Thunderstorm or Lightning

- Try to find a safe place like a house or a structure during a thunderstorm.
- If you're out there, try to avoid open spaces like fields or elevated places.
- Keep away from branches, poles, and metal items.

- Squat your head between your knees on the ground.
- If you are inside your house or home, stop using any electrical appliances or running water.

Points to Remember

- Rubbing some object with another object can charge them.
- Positive and Negative charges are the two types of charges.
- Charges that are similar repel each other, while charges that are not similar attract each other.
- Static charges are the electrical charges created by rubbing.
- An electric current is formed when charges move.
- To determine if a body is charged or not, an electroscope can be employed.
- Earthing is the process of transferring charge from a charged object to the ground.
- Lightning is caused by an electric discharge between clouds and the earth or between clouds.
- Clouds are formed by the collision of water droplets in the atmosphere.
- The particles in the atmosphere are charged as a result of friction.
- Towards the bottom of the cloud, negative charges build, while positive charges accumulate at the top.
- The cloud will induce positive charges on the ground nearby as the charge accumulation increases.
- The negative charges on the cloud tend to make a route towards the earth as the quantity of charge grows, resulting in a narrow streak of electrical discharge known as lightning.
- A lightning strike has the potential to damage both people and property.
- During a lightning strike, it is critical to take precautions.
- The most popular measures are taking shelter in interiors (houses or other closed areas) and vehicles (closed e.g. autos).
- Buildings can be protected against the impacts of lightning by using lightning conductors.
- An earthquake is a natural occurrence that cannot be foreseen.
- The crust, mantle, and core are the three primary layers that make up the earth.
- The inner core and the outer core are two parts of the core.

- The crust floats above the mantle, which is made up of semi-solid material.
- Oceans and continents make up the crust.
- The crust is separated into tectonic plates, which are made up of different sections.
- Fault zones are the areas where one tectonic plate slides against another, and these are the areas where earthquakes are most likely to occur. As a result, these areas are known as seismic zones.
- The focus of an earthquake is the location in the earth's interior where it happens, and the region on the surface of the earth closest to the focus is likely to suffer the most damage. The epicentre of the earthquake is located in this area.
- A seismograph is a device that measures the magnitude of an earthquake. It consists of a rolling drum and a pendulum with a stylus that traces the waves of an earthquake on a graph paper-like sheet.
- The energy generated at the epicentre of an earthquake travels outward in the form of seismic waves.
- On the Richter scale, an earthquake's destructive energy is measured.

It is a logarithmic scale that ranges from 1 to 10 and is used to indicate the magnitude of an earthquake.

An earthquake of a magnitude of 7 or higher on the Richter scale can cause significant damage to people and property.

Protective Measures for an Earthquake:

1. **If You're at Home :**
    - Take cover behind a table and wait for the shaking to cease.
    - Keep a safe distance from towering, heavy things that could collapse on you.
    - If you're in bed, don't get out of it. Use a pillow to shield your head.
2. **If You are Outdoors:**
    - Locate a site that is free of houses, trees, and overhead power wires.
    - Toss yourself on the ground.
    - If you're in a car or on the bus, don't get out. Request that the driver drives gently to a safe location.
    - Come out only when the earthquakes have stopped.

Furthermore, it is important to keep building structures simple so that they are ‘Quake Safe.'