

## Grade 10 – Science

Lesson 1 - Earth and Space

Lesson 2 - The Earth's Interior

Lesson 3 - Electricity and Magnetism

Lesson 4 - Electromagnetic Spectrum

## Lesson 1 - Earth and Space

**Lithosphere** consists of crust and the upper portion of the mantle.

**Plates** are large pieces of the upper few hundred kilometers of Earth that move as a single unit as it floats above the mantle.

**The plates** are in constant motion. As they interact along their margins, important geological processes take place, such as the formation of mountain belts, earthquakes, and volcanoes.

Strong earthquakes generated at the ocean floor may cause displacement of large volume of water and launch big waves called **tsunami**.

When two continental plates meet head-on, neither is subducted. Instead, the crust tends to buckle and be pushed upward **causing formation of mountain ranges and other highlands**.

**Divergent boundaries** occur along spreading centers where plates are moving apart and new crust is created by magma pushing up from the mantle.

**Plate tectonics**. A theory which suggests that Earth's crust is made up of plates that interact in various ways, thus producing earthquakes, mountains, volcanoes and other geologic features.

**Primary (P) wave**. The first type of seismic wave to be recorded in a seismic station.

**Secondary (S) wave**. Second type of earthquake wave to be recorded in a seismic station.

**Seismogram**. A record made by a seismograph.

**Seismograph**. A device used to record earthquake waves.

## Lesson 2 - The Earth's Interior

The knowledge about **seismic waves** is very important in understanding the discovery of the different layers of the Earth as well as in determining the properties of these layers

**The ability of the asthenosphere** to flow slowly is termed as plasticity.

**Seismic Waves** – Mechanical vibrations that occur inside the earth (along fault lines) which is caused by the breakage of rocks.

### Main types of seismic waves

Surfaces waves – Subtypes

Love waves and Raleigh waves

Body waves

Primary waves and secondary waves

**Oxygen** is the most abundant element in the Earth's crust

The elements silicon, oxygen, iron and magnesium make up the mantle.

**The outer and the inner core are made mostly of iron and nickel.** The outer core reaches a temperature of 2000°C. With this temperature, the iron and nickel melt thus, this layer is liquid. The inner core has a temperature as high as 5000°C. It is compact despite of the very hot temperature because of the very great pressure that keeps this layer in the solid phase.

**The Earth is composed of three main layers:**

the crust, mantle, and core which is subdivided into outer core and inner core

**The asthenosphere is the weak** layer of the mantle on which the lithosphere floats.

**The outer core is made up of molten material.** The outer core accounts for the Earth's magnetic field

## Lesson 3 - Electricity and Magnetism

### Principles of Electromagnetic Induction (EMI) in Recording Systems

In recording systems and technology, whether analog or digital, magnetic recording is the name of the game. In a magnetic recording of a music or video input, the signal is converted into electrical signals via transducers like a microphone.

It then passes through a magnetic recorder like the read/write head of a video disc player, converting and recording the electrical signals into a magnetic pattern on a medium like a laser disc or a cassette tape. During recording and playback, the magnetic medium moves from the supply reel to the take-up reel.

### The Nature of Magnetism: Electricity's Silent Partner

**Magnetism** is a property of a material that enables to attract or repel other materials. The presence and strength of the material's magnetic properties can be observed by the effect of the forces of attraction and repulsion on other materials. Its polarity, three-dimensional field form, strength, and direction can also be detected by the deflection of a magnetic pointer within its field, like that in a compass or the arrangement of iron filings in magnetic boards.

**A magnetic field** is a field of force produced by a magnetic object or particle, or by a changing electrical field and is detected by the force it exerts on other magnetic materials and moving electric charges. Magnetic field sources are essentially dipolar in nature, having a north and a south magnetic pole.

**Characteristics of a magnetic field** around a permanent magnet can be examined more closely by studying the pattern of paramagnetic particles brought near the vicinity of the permanent magnet.

## Lesson 4 - Electromagnetic Spectrum

**Electromagnetic Waves** We are surrounded with thousands of waves. Waves collide with our bodies and some pass through us. Most of these waves are invisible but we can perceive some. The warmth of the sun and the light that we see are just a few of them. These waves share similar characteristics, yet, they are unique in some ways. These waves are called Electromagnetic Waves.

**Radiation** is the term used to describe the transfer of energy in the form of EM wave. For a mechanical wave to travel, it must vibrate the medium as it moves. This makes use some of the waves' energy.

**Electromagnetic waves** can also transmit with a material medium. They can also transfer energy to the medium itself. When they interact with matter, their energy can be converted into many different forms of energy. With these characteristics, electromagnetic waves are used for a wide variety of purposes.

**Radio Waves** - Radio waves are the EM waves found at the left end of the EM spectrum (arranged from low frequencies to high frequencies). They are the type of EM waves with the longest wavelength but they are of low frequencies thereby carrying the lowest energy from among the EM waves.

**Radio waves have the following characteristics:**

1. Not line of sight
2. Can pass through walls
3. Longer range
4. Not light sensitive

**Some of the disadvantages of radio frequencies include:**

1. Communication devices that make use of the same frequencies interfere with their transmission.
2. It is easier to “eavesdrop” since signals are transmitted in space rather than a wire.
3. More costly than infrared

**Microwaves** are applied in so many ways from texting to cooking, and to communications to the rest of the world.

**The Visible Spectrum** -The visible light shares the thinnest slice in the electromagnetic spectrum. It lies in between the infrared and the ultraviolet rays. It is the only EM wave perceived by the human eye. If not because of the visible light, we will not be able to see the beauty of our surrounding much less appreciate it.

**Ultraviolet radiation** is the part of the electromagnetic spectrum that consists of frequencies higher than that of the visible light but lower than the x-rays. Having higher frequency, UV rays carry higher amount of energy. They can damage tissue, burn the skin and damage the eyes.

**Waves in the EM spectrum include the following from the longest wavelength to the shortest wavelength:**

**Radio waves**

Microwaves

Infrared waves

Visible light

Ultraviolet

X-rays

Gamma rays