Q\ What is geology?

Geology:

It is the science concerned with studying the dynamics (kinematics) of the earth and the developments it undergoes and the sources of energy embedded in it, not to mention that this science is concerned with investigating the vital processes that have contributed to the formation of the globe thousands of years ago by relying on the study of rocks. The minerals that surround us, the processes that led to the formation of these minerals, the waters that flow on its surface, the changes that occurred over its various geological eras, and the changes expected to occur in the near future in which we use logical conclusion and scientific methods to understand geological problems. It is also the most integrated science among all sciences because you must understand and apply other sciences: physics, chemistry, biology, mathematics, astronomy, and others.

Geology is divided into many sub-sciences, and the most prominent of these sciences we mention the following: -

1- Environmental geology: -

This science is concerned with studying soil and water and working to find solutions and remedies for areas affected by environmental pollution.

2- Engineering Geology:

This science is working with geologists to find a future planning for the mechanism of building buildings, bridges, roads and dams after studying each of the strength of rocks and the extent of balance and slope in the surface of the earth and the composition of the soil.

3- Educational geology: -

This field of geology is what we see and study in the initial educational stages and then in universities and institutes.

4- Petroleum geology and economics: -

This branch of geology is concerned with research and investigation of natural energy sources such as petroleum, coal, raw materials and natural gas.

The most prominent geologist is the Scottish scientist,

1- Physician and chemist **James Hutton**, who is considered the father of contemporary geology.
2- The Scottish scientist and lawyer **Charles Lyell**, who lived between the eighteenth and nineteenth centuries AD.
3- British scientist Mary **Horner Lyell** was born in the nineteenth century, the wife of scientist Charles Lyell.
4- German scientist **Alfred Wegener**, a specialist in geology and meteorology.
5- The Danish scientist **Inge Lehmann** was behind the discovery of the Earth's core.
6- The French scientist **Georges Cuvier**, the father of paleontology.
7- The American scientist of Swiss origin **Louis Agassiz**, who specialized in the sciences of geology and biology.

The importance of geology

The importance of geology is great, as it enables us to:-

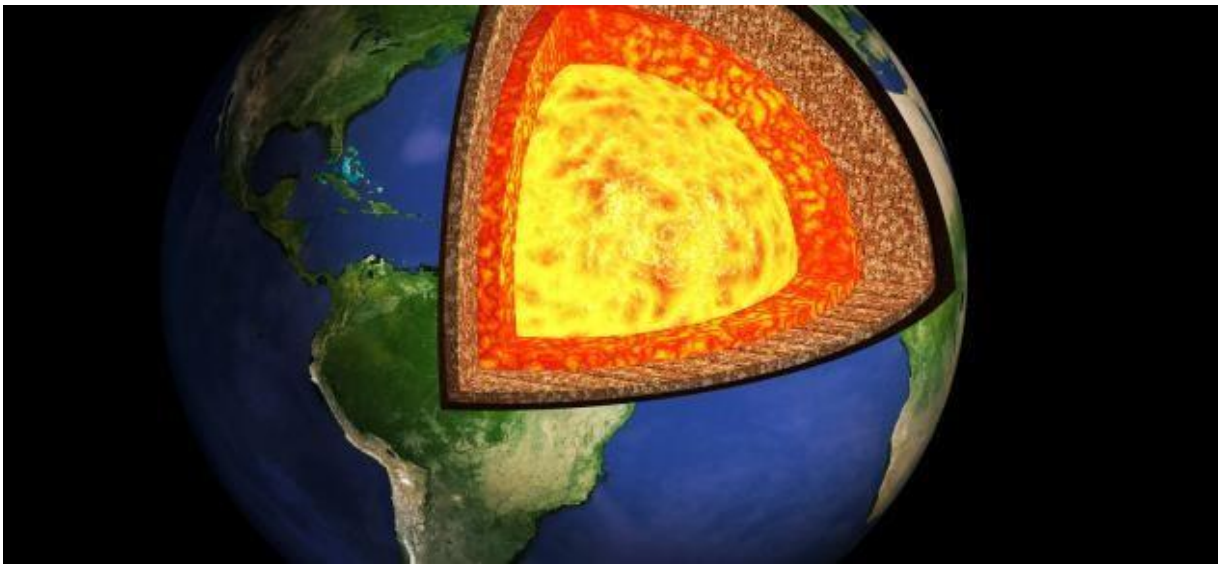
1- study the earth on which we live.
2- just as geology is the study of the earth and the materials from which it was created and the structure of those materials and the processes that obtain them.
3- and it includes the study of living organisms that inhabited our planet for millions of years until now, and there is an important part. From geology is the study of how Earth's materials, structures, processes, and organisms change over time. Geologists also work to understand the history of our planet and are the most important aspects of explaining the importance of geology. The better they understand Earth’s history, the better they can predict how past events and processes will affect the future.

studied the components of the earth

Many processes such as landslides, earthquakes, floods, and volcanic eruptions can be dangerous to people, and geologists are working to understand these processes well enough to avoid building important structures where they may be damaged which shows the importance of geology. If geologists can create maps of flooded areas in the past, they can create maps of areas that may be flooded in the future.These maps can be used to guide community development and identify places that require flood protection or flood insurance.

layers of the earth

The layers of the earth were classified according to the mechanics into layers and studied according to their mechanical or physical properties such as durability, stiffness, and the physical condition of each of the layers. Therefore, the earth's layers were divided into five different layers, which are as follows: -



1- Lithosphere

The lithosphere is the first layer of the earth's layers, and it is the solid outer surface on which all living things, including humans, live, and the lithosphere forms what is known as the tectonic plates of the Earth, which move relative to each other Most of the lithosphere is composed of solid rocks except for a small percentage of magma at the bottom of volcanoes or in places where flow of these magmas occurs, and that percentage does not exceed (0.1%)of the volume of the entire lithosphere of the Earth, and the lithosphere consists of two main parts, namely (**Crust**) which is the upper part of the lithosphere, and (**mantle**) which forms the lower part of the lithosphere, and these two parts form with each other a relatively solid layer extending across the earth, the entire lithosphere layer, as it extends for a distance starting from Zero on the surface of the earth to approximately 100 km along its interior.

2- Asthenosphere

is located below the lithosphere, as this layer extends from (100 km to about 350 km) towards the ground, and the fluid cover layer is characterized as a relatively weak layer, as this layer behaves like plastic materials - materials with a high ability to form without breaking. More than the behavior of the solids that the lithosphere conducts, and thus it is roughly similar to the chemical properties of what is known as the lithosphere veil, except that the fluid envelope is characterized by its ductility, and this is due to its proximity to high temperatures that may reach a degree sufficient to melt the rocks in it. Also, the presence of molten rocks among the minerals of the fluid atmosphere makes it acquire its fluid nature, unlike the lithosphere, which contains completely solid minerals that make its rocks solid and bonded with each other despite the partial melting of the rocks in it. The fluid envelope is a major source for most (**magma**) due to the proximity of that envelope's temperature to the (**melting point**), and most of the places forming it may contain partially molten rocks, and the fluid envelope has a close relationship in activating the formation of volcanoes on plate boundaries Tectonics, where these plates press on the fluid envelope or push water towards it, which leads to the eruption of magma in it to the surface of the earth's crust on the boundaries of tectonic plates, forming volcanoes in those areas. Centimeters per year.

3- mesosphere

The layer of the middle cover, the mesosphere, or the mantle in English (Mesosphere) extends at a depth ranging between (350 km to 2900 km) towards the ground and below the fluid mantle, and the middle cover is divided into two main layers, namely: -

A- The upper middle layer or the (upper mesosphere).

B- the lower middle layer or the (lower mesosphere)

As the density of rocks increases with increasing depth through the upper layer in response to the increase in rock pressure, and this is why it is called the transition zone. With the continuation of progress in the earth's layers and reaching the envelope of the lower middle layer, the density of rocks increases very dramatically and suddenly, as a result of the exposure of the crystal structure of most minerals in the rocks of that layer to changes that increase its density, but this density remains almost constant along the entire length of the envelope. The average lower mean, which starts from a depth of (660 km) reaches the boundaries of the outer core of the earth at a depth of approximately (2,900 km).

4- Outer core

The outer core layer is located below the middle layer, the mantle, or the mesosphere, as this layer is characterized by its presence in the liquid state only, because it contains elements and metals in the liquid state such as iron, nickel and other elements, thus it is responsible for the emergence of the magnetic field of the planet It is worth noting that this layer has been adopted in the chemical and mechanical classifications of the Earth's layers.

5- inner core

The inner core layer in English (Inner core) is subjected to a high pressure more than the other layers, which makes it of a solid nature, and it is worth noting that this layer is similar to the outer core layer with the mineral composition that contains large amounts of iron element, in addition to the similarity of temperatures in the two layers to Somewhat higher in the inner core layer.