Earth's Interior and Its Material

Lesson No.	Title	Activity
2	Earth's Interior and Its Material	Identify types of rocks found nearby as per the characteristics explained in SLM

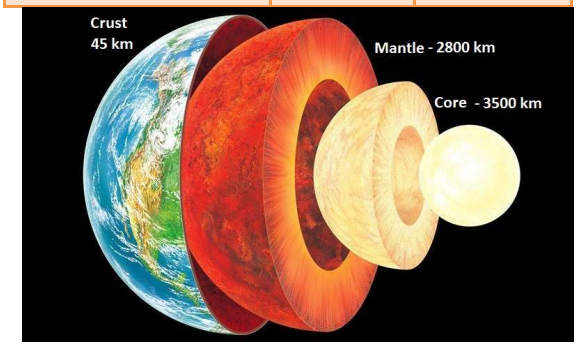
Meaning

The earth is sphere in shape and its visible features can be experienced on the surface. But, huge size of earth, increasing temperature and pressure limited the direct observations. The earth has three concentric layers NIFE, SIMA and SIAL. These three layers have difference over temperature, pressure and density. The uppermost layer has most significant part called Crust containing rocks. On the basis of formation rocks are of three types – Igneous, Sedimentary and Metamorphic. With the span of time, these rocks are also disintegrated physically or chemically. This process is termed as weathering and changes the face of earth's surface.

Structure of the Earth's Interior

The interior part of the earth cannot be observed directly due to increasing temperature and pressure and also restrict deep drilling. On the basis of limited direct observation and other sources, earth's interior has been divided into three concentric layers.

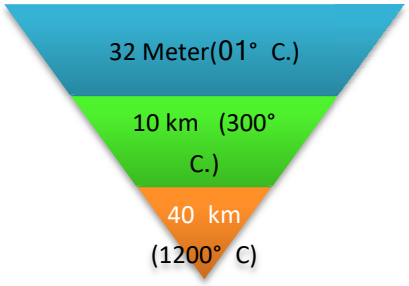
Layer	Density	Width
Core (NIFE) • Inner Solid Layer • Outer Semi Liquid layer	9.5-14.5	3500 km
Mantle (SIMA)	3.3 – 5.7	2800 km
Lithosphere (SIAL) *Crust*	2.7-2.9	100 km *8-40 km*



Temperature, Pressure and Density of the Earth's Interior

Temperature

- Temperature increases with increase in depth but increase is not uniform.



- At this rate earth's core should be in liquid form which is not.
- The pressure of overlaying rocks also increases with depth therefore melting temperature increases.
- The behavior of seismic waves also indicates the variation in temperature.

Pressure

- The pressure of overlaying rock increases with depth.
- Pressure at core is more than 3-4 more million times than at sea level.
- The material at core acquire the property of solid.

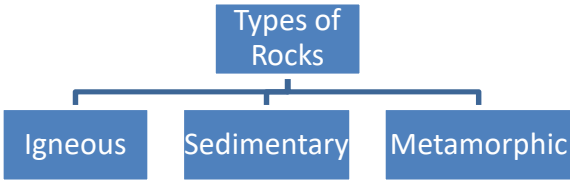
Density

- The increasing temperature and pressure resulted in increasing density towards core.

Materials of the Earth's Crust

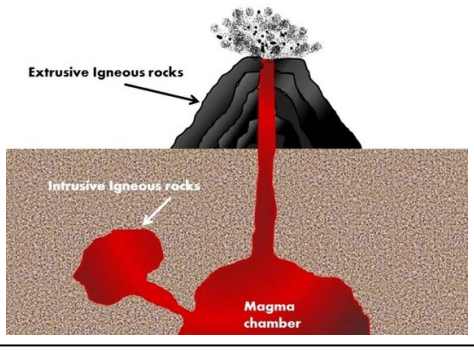
- Most important layer of earth because occupied by human.
- This layer is made of rocks which are mixtures of various minerals.
- It contains more than 2000 minerals.
- There are 6 major minerals - feldspar, quartz, pyroxenes, amphiboles, mica and olivine.

Types of Rocks



Igneous Rock

- The word igneous is derived from the Latin word 'ignis' meaning fire
- Made from cooling of magma
- It requires a greater quantity of heat to melt the rocks under overlying pressure than at the surface.
- It is formed at different depths not exceeding 40 km.
- When magma is ejected to the surface, it is called lava.
- As they comprise the earth's first crust these are called the parent of all rocks or the 'primary rocks'
- Types of Igneous Rocks:
  - Extrusive igneous rocks- formed by cooling of lava on the earth's surface. Ex.- Gabro, Besalt
  - Intrusive igneous rocks- formed below the earth's surface. Ex.- Granite and dolerite

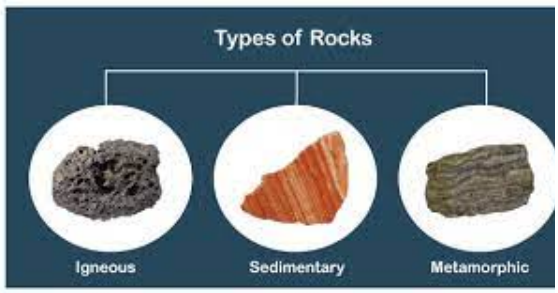


Sedimentary Rocks

- Formed due to continuous deposition of sediments received from existing rocks
- These sediments are layered or stratified
- These rocks have fossils in their layers
- The broken rock particles are transported by running water, ocean currents, glaciers or even by wind from one place to another.
- These broken material are soft and unconsolidated in beginning and later hardened to a compact material by excessive pressure and cementation to form sedimentary rocks.
- There are three types of processes which form sedimentary rocks-
  i. Mechanically formed sedimentary rock.
  ii. Organic sedimentary rocks
  iii. Sedimentary rocks of chemical origin
- Ex.- Conglomerate, Coal, limestone, Gypsum, Rock salt, Nitre
- Folded Mountains like Himalaya, Alps etc are made of sedimentary rocks.

Metamorphic Rocks

- Metamorphic rocks are formed under the influence of heat or pressure on sedimentary or igneous rocks.
- Tremendous pressure and high temperature change the colour, hardness, structure and composition of all types of pre-existing rocks.
- The process of this change is called Metamorphism
- Rocks formed due to this process are defined as the Metamorphic rocks.
- The process of change by heat is called thermal or contact metamorphism.
- Rocks due to tremendous pressure is known as dynamic or regional metamorphism.



Name of rock	Type of rock	Name of metamorphic rock
Limestone	Sedimentary	Marble
Dolomite	Sedimentary	Marble
Sandstone	Sedimentary	Quartzite
Shale	Sedimentary	Slate
Slate	Metamorphic	Phylite/ Schist
Coal	Sedimentary	Graphite/ Diamond
Granite	Igneous	Gneiss
Phyllite	Metamorphic	Schist

Economic Significance of Rocks

- Soils- Provides agricultural products and raw material for industry
- Building Material- Source of various kind of material. Granite, gneiss, sandstone, marble and slates etc are extensively used.
- Mineral Source- Obtained from different rocks.
- Raw Material – Raw material from different industries.
- Precious stones- Precious stone like diamond etc are found in metamorphic or igneous rocks.
- Fuel- Fuel in the form of coal, petroleum, natural gas and nuclear minerals etc derived from rocks.
- Fertilizer – Derived from some rocks.

Do You Know

What is Fossil?

Fossil is termed as the remains of dead animals and plants that once lived on this earth in the remote past. **Fossils** are not entirely decomposed by nature. This may vary from microscopic to dinosaurs. These fossils are found in formed one after another over years. The deeper layer reflects the older fossil.

Evaluate Yourself

1. What kind of sources would you use to know about the earth's interior?
2. Draw and label a diagram showing earth's interior, its density and depth.
3. Distinguish between a rock and a mineral with suitable examples.
4. On the basis of the key characteristics differentiate between sedimentary and metamorphic rocks.
5. What kind of utility of rocks do you find in your area? Explain with suitable examples.