UGC-NTA NET/SET/JRF-JUNE 2020

PAPER- II

GEOGRAPHY

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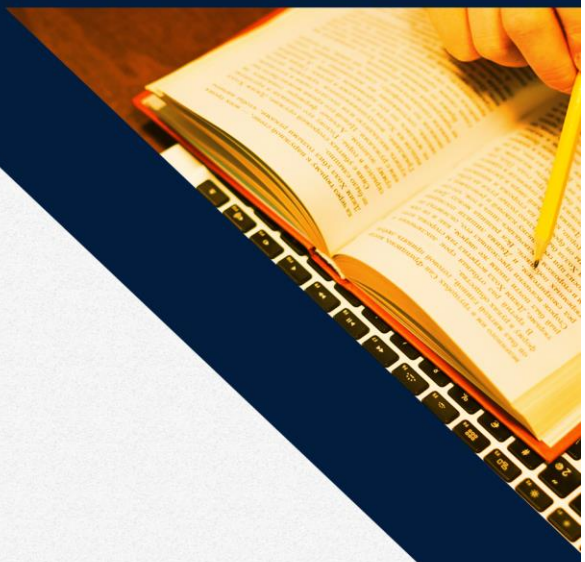
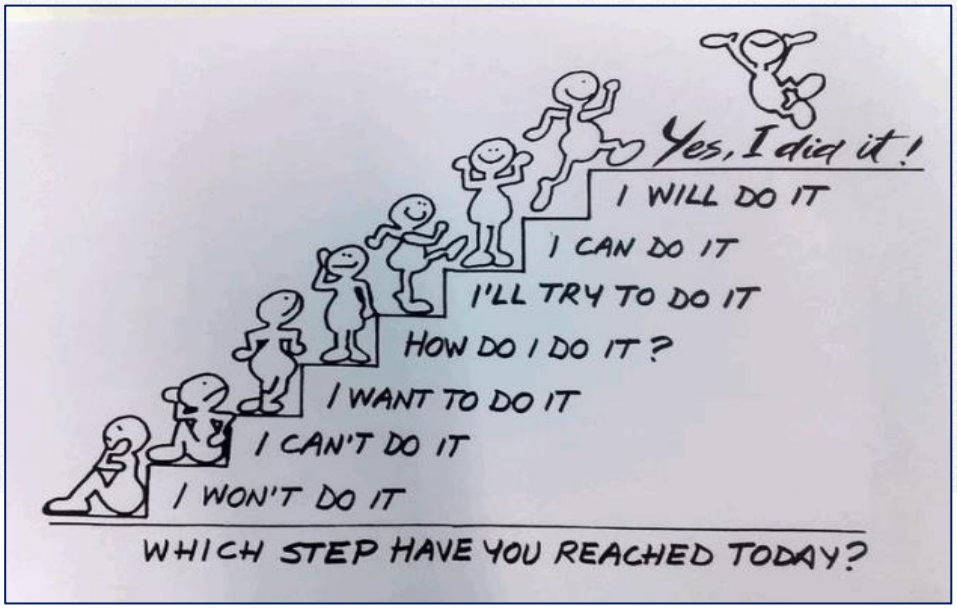




Earth Movement

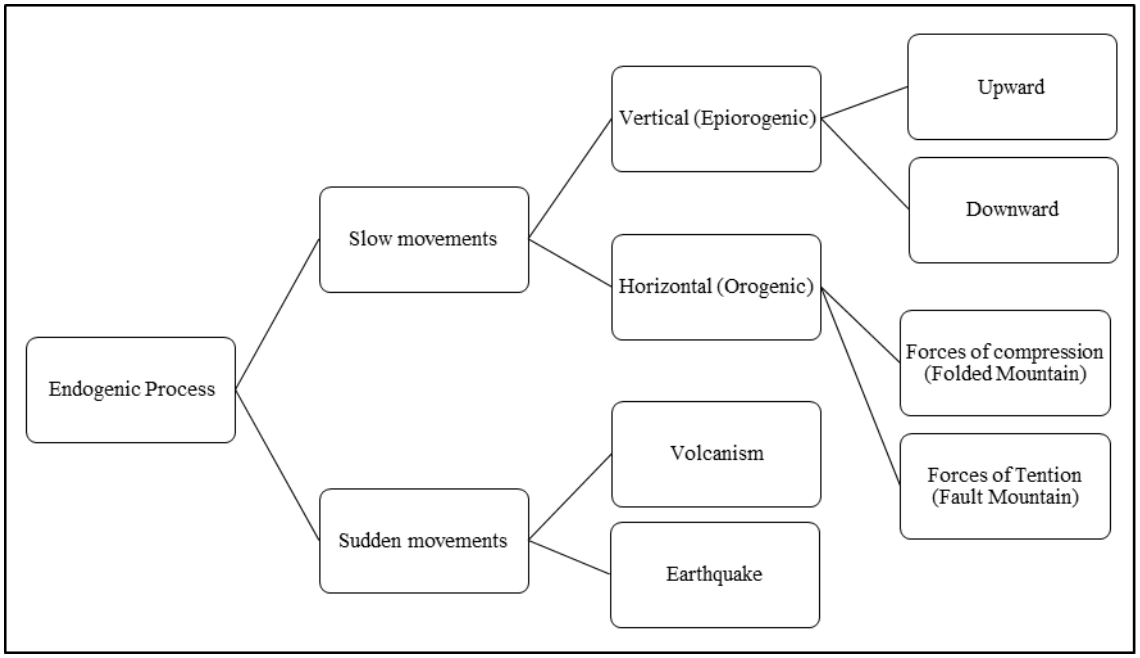
Immanuel Kant, a geographer argued that gaseous clouds (nebulae) slowly rotate, gradually collapse and flatten due to gravity, eventually forming stars and planets.

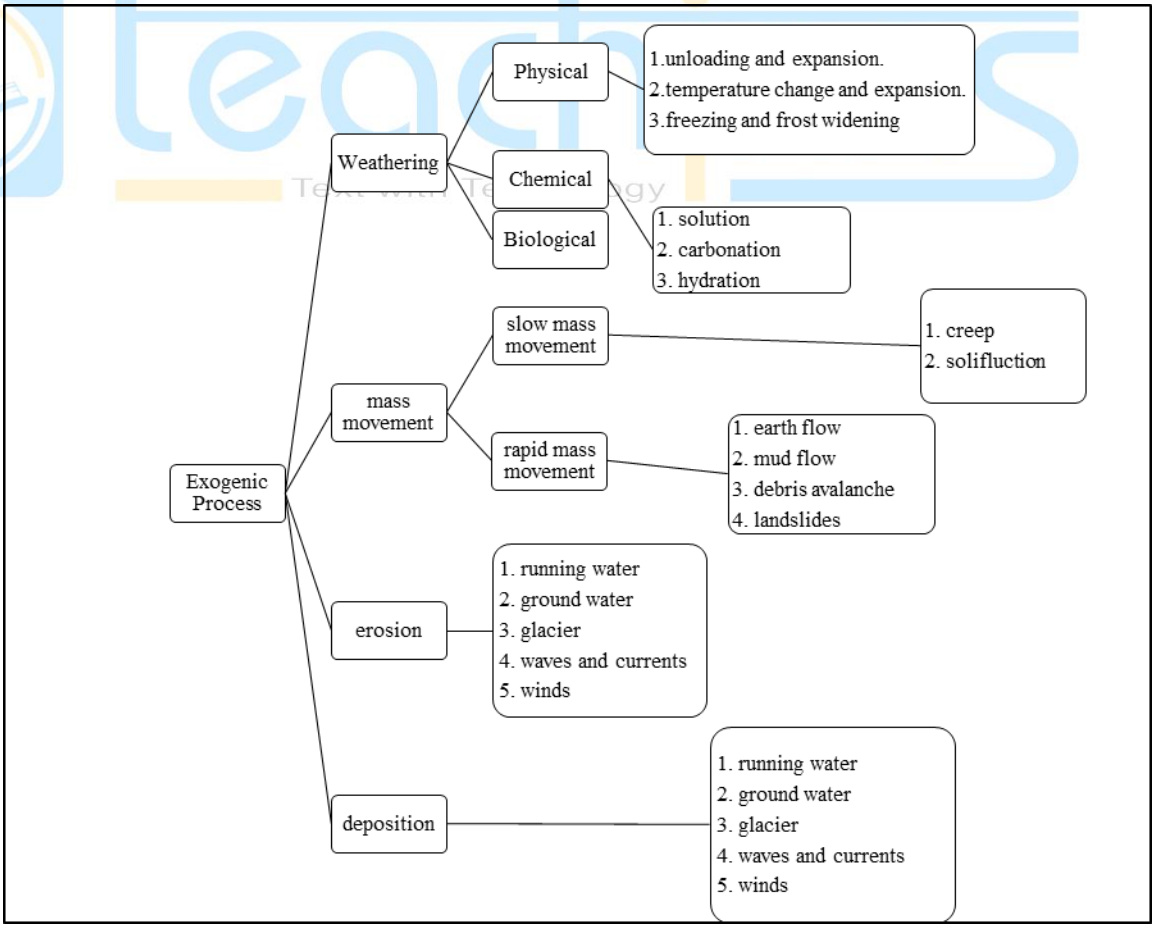
In our solar system the Earth is third planet from the Sun. The earth crust (Lithosphere) is harder; the inner part of the earth is semi liquid to liquid. Earth has atmosphere and hydrosphere. It sustains life (biosphere). The living beings are present on Lithosphere and hydrosphere; and a little amount in atmosphere.

Surface to Upper Mantle, the solid outer part of the earth is called Lithosphere. Plates are also present in this sphere. Lithosphere is divided into two groups – i) Oceanic lithosphere and ii) Continental lithosphere

1.1.1 Endogenetic and Exogenetic forces:

Endogenous processes such as volcanoes, earthquakes, and plate tectonics uplift and expose continental crust to the exogenous processes of weathering, of erosion, of deposition and of mass wasting.


Endogenic Process
Slow movements
Sudden movements
Vertical (Epiorogenic)
Horizontal (Orogenic)
Volcanism
Earthquake
Upward
Downward
Forces of compression (Folded Mountain)
Forces of Tention (Fault Mountain)


Exogenic Process
Weathering
mass movement
erosion
deposition
Physical
Chemical
Biological
slow mass movement
rapid mass movement
1.unloading and expansion.
2.temperature change and expansion.
3.freezing and frost widening
1. solution
2. carbonation
3. hydration
1. creep
2. solifluction
1. earth flow
2. mud flow
3. debris avalanche
4. landslides
1. running water
2. ground water
3. glacier
4. waves and currents
5. winds
1. running water
2. ground water
3. glacier
4. waves and currents
5. winds

Example and explanation: The **Peninsular plateau** is a tableland. It is composed of the old crystalline, igneous and metamorphic rocks. The **Peninsular plateau** is considered the oldest land mass as it was **formed** due to the drifting of the Gondwana land.

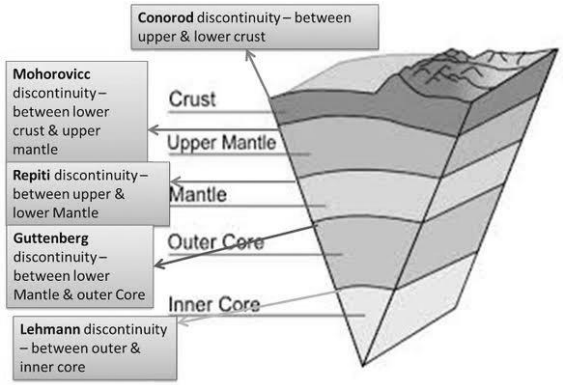
1.1.2 Structure of the Earth:

Layers: The five layers are the lithosphere, asthanospheric, mesospheric mantle, outer core, and the inner core.

Depth from Surface in Kms.	Layer
0–60	Lithosphere (locally varies between 5 and 200 km)
0–35	… Crust (locally varies between 5 and 70 km)
60–210	Asthenosphere
35–60	… Uppermost part of mantle
35–2,890	Mantle
210-270	… Upper mesosphere (upper mantle)
660–2,890	… Lower mesosphere (lower mantle)
2,890–5,150	Outer core
5,150–6,360	Inner core

Discontinuities:

1. Conrad Discontinuity- Upper Crust and Lower Crust.
2. Moho Discontinuity – Crust and Mantle.
3. Repetti Discontinuity – Upper Mantle and lower Mantle.



4. Gutenberg Discontinuity – Mental Layers and discontinuities and Core
5. Lehmann Discontinuity – Outer Core and Inner Core

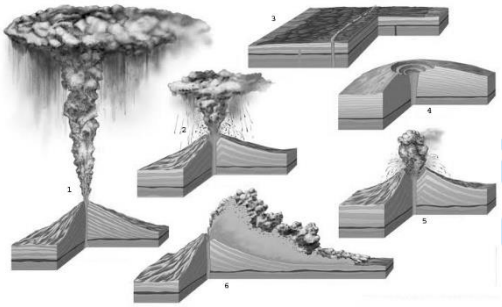
1.1.3 Volcano and eruption types Lahar

Volcano is a weak place, where liquid or semi liquid magma (asthanospheric material) can come out (i.e. lava) and make a cone shaped landform in crust.

Volcanic eruption can damage all three spheres (Lithosphere, Hydrosphere and Atmosphere) of the earth.

Types of Magmatic eruptions :

1. Plinian
2. Vulcanian
3. Icelandic
4. Hawaiian(Hawai, Mauna Loa)
5. Strombolian
6. Peléan



Types of Magmatic eruptions

Types of eruption by their sound:

1. Effusive
2. Explosive

Types according to the property of magma:

1. Basaltic magma (less viscus-iceland, Deccan trap of india)
2. Andesitic magma (medium viscus- Indonasian Crakatoa)
3. Rlyolitic Magma (highly viscus- Yellowstone national park of USA)

Some volcanoes are covered with snow and ice. If they erupt, melted snow and ice mixes with mud and volcanic ash and flows down through mountain. This type of volcanic flow is called **Lahar**.

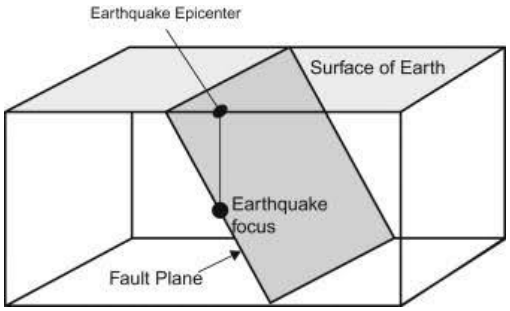
1.1.4 Earthquake, Richter's scale and Tsunami

An earthquake is shaking of earth, resulting of sudden release of energy stored in Lithosphere. It releases seismic waves(P,S,L waves).

Focus is the location where the earthquake originates.

Epicenter is a point on the Earth's surface just above the focus.

The Richter magnitude of an earthquake is determined from the logarithm of the amplitude of waves recorded by seismometer. In seismograph reading difference between 5 and 4, it gives 10 times greater reading from 4. At the same time it releases 31.6 times larger energy from 4.



Focus and Epicenter

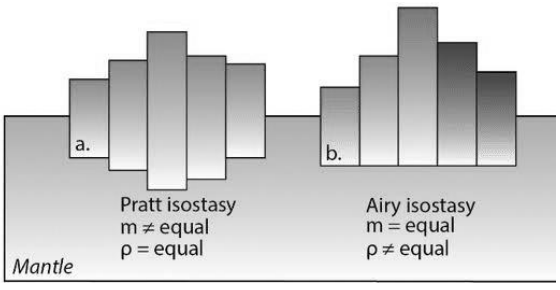
A series of waves in a water body caused by the displacement of a large volume of water, generally in an ocean caused by Earthquakes, volcanic eruptions and other underwater explosions is called Tsunami.

1.1.5 Isostacy :

The general term 'isostasy' was introduced in 1882 by the American geologist C Dutton.

The principal models of isostasy are :

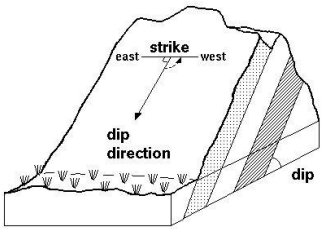
1. Airy's model – where different topographic heights are accommodated by changes in crustal thickness, in which the crust has a constant density.
2. The Pratt's model – where different topographic heights are accommodated by lateral changes in rock density. He introduces line of compensation concept.



Isostacy : Models of Pratt and Airy

1.1.6 Fold and Fault:

Dip and strike: The strike line of a bed, fault, or other planar feature, is a line representing the intersection of that feature with a horizontal plane. The dip gives the steepest angle of descent of a tilted bed or feature relative to a horizontal plane.



Dip and Strike

1.1.6.1 Types of fold:

Anticline: linear, strata normally dip away from axial center, oldest strata in center irrespective of orientation.

Syncline: linear, strata normally dip toward axial center, youngest strata in center irrespective of orientation.

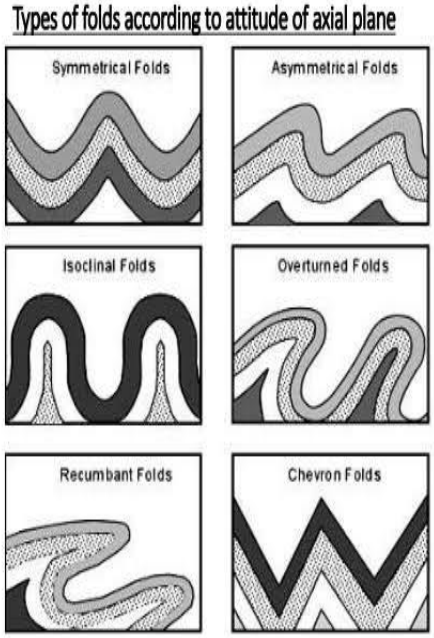
Antiform: linear, strata dip away from axial center, age unknown, or inverted.

Synform: linear, strata dip toward axial center, age unknown, or inverted.

Monocline: linear, strata dip in one direction between horizontal layers on each side.

Chevron: angular fold with straight limbs and small hinges

Recumbent: linear, fold axial plane oriented at low angle resulting in overturned strata in one limb of the fold.



Types of folds

Nappe:Nappes form when a mass of rock is forced (or "thrust") over another rock mass, typically on a low angle fault plane.

Disharmonic: Folds in adjacent layers with different wavelengths and shapes.

1.1.6.2 Types of Faults:

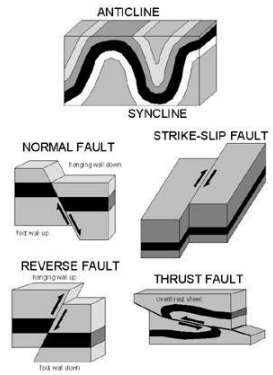
Based on the direction of slip, faults can be categorized as:

1.strike-slip, where the offset is predominantly horizontal, parallel to the fault trace;

2.dip-slip, offset is predominantly vertical and/or perpendicular to the fault trace; or

3.oblique-slip, combining strike and dip slip.

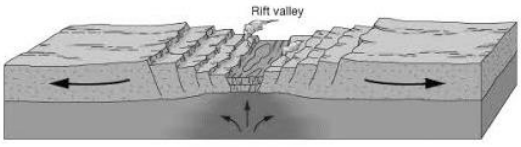
The several types are also- a) normal fault, b)reverse fault, c)thrust fault etc.



Types of faults

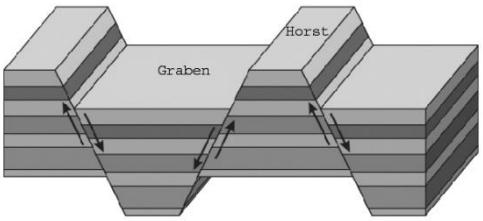
Fault forming landforms:

1. Rift Valley: A **rift valley** is a linear shaped lowland between several highlands or mountain ranges created by the action of a geologic **rift** or fault. A **rift valley** is formed on a divergent plate boundary, a crustal extension or spreading apart of the surface, which is subsequently further deepened by the forces of erosion. Very frequently sevier earthquake is happen by this process.



Rift valley

2. Horst and Grabon:A horst is a raised block of the Earth's crust that has lifted, or has remained stationary, while the land on either side (graben) has subsided.



Horst and Graben

1.1.7 Theories of Mountain Building:

The concept of the geosyncline was introduced by the American geologist James Hall in 1859**.**

1. Thermal contraction theory by Jeffrey:

In his opinion folded mountains are formed by following causes-

i) thermal radiation of outer part of the earth makes itself shrinking

ii) reduction of rotational speed of earth also reduced.

2. Geosynclinal theory of Kober:

As per his openiun folded mountain is formed in geosyncline. Geosyncline deposits in between regid masses. By the lateral movement of rigid masses following stages are happned:

i) Lithogenesis, ii) Orogenesis, iii) Gliptogenesis

3. Hypothesis of Sliding Continent by Daly:

In his opeion-

i) Geosyncline is disposit on the continental mass.

ii) Continue deposition on geosyncline make itself heavier.

iii) underneath continental land mass can not take stress of the geosyncline.

iv) a part of continental mass slides under the asthenosphere.

v) at the same time lateral stress on geosyncline stress make folded mountain.

4. Thermal Convection Current Theory by A. Holmes

In his openion-

i) the surface of the earth and oceanfloor is solid.

ii) inner part of the earth is liquid and hot ie asthenosphere.

iii) due to presence of hot and liquid state of the asthenosphere it has some rotational currents.

Iiv) by this current the solid surfaces are moving slowly.

5. Radio- activity and Surface History of Earth:

Jolly believes -

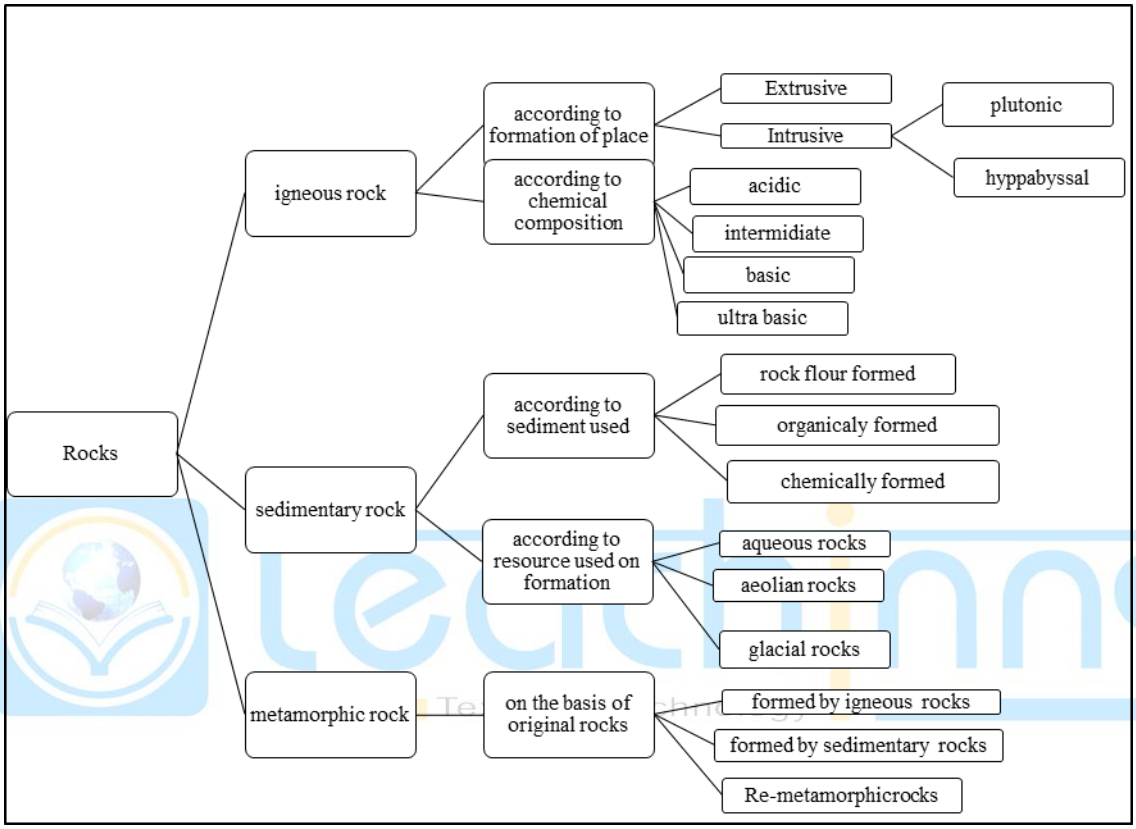
i)sima is less drencher than sima.

Iii) sima increases volume after melting, and get less denser.

1.1.8 Types of rocks and minerals:

The outer part of earth is formed by solid components are called rocks. There are three types of rocks - i) igneous ii) Sedimentary and iii) metamorphic rocks.

Rocks are formed by the components are called **minerals**.



1.1.8.1 Igneous Rock:

Rocks formed by the cooling and solidifying of molten materials.

Examples: Granite, Basalt

1.1.8.2 Sedimentary Rock:

Rock that has formed through the deposition and solidification of sediment, especially sediment transported by water (rivers, lakes, and oceans), ice (glaciers), and wind.

Examples: Mudstone, Sandstone

1.1.8.3 Metamorphic Rock:

A **metamorphic rock** is a type of **rock** which has been changed by extreme heat and pressure

Examples:

Basalt ⟶ Amphibolites

Granite ⟶ Gneiss

Sandstone ⟶ Quartzite

Shale ⟶ Slate

1.1.9 Geological Time Scale:

Geological Time Scale deals with the chronological order of evolution of life and landforms.

Era	Period	Epoch	Plant and Animal Development
Cenozoic	Quaternary	Holocene (.01)	1000 years before sea level become 130 meters lower than today because of latest ice age. **Humans develop**
		Pleistocene (1.8)	
	Tertiary	Pliocene (5.3)	"Age of mammals"
		Miocene (23.8)	
		Oligocene (33.7)	Extinction of dinosaurs and many other species. Volcanic eruption and climatic change happned
		Eocene (54.8)	
		Paleocene (65.0)	
Mesozoic	Cretaceous (144)	"Age of Reptiles"	First flowering plants
	Jurassic (206)		First birds
	Triassic (248)		Dinosaurs dominant.

Paleozoic	Permian (290)	"Age of Amphibians"	Extinction of trilobites and many other marine animals
	Carboniferous: Pennyslvanian (323)		First reptiles
	Carboniferous: Mississippian (354)		Large coal swamps Large Amphibians abundant.
	Devonian (417)	"Age of Fishes"	First insect fossils
	Silurian (443)		Fishes dominant First land plants
	Ordovician (490)	"Age of Invertibrates"	First fishes
	Cambrian (540)		Trilobites dominant First organisms with shells
Precambrian - comprises about 88% of geologic time (4500)			First multicelled organisms First one-celled organisms Origin of Earth

The numbers are in millions of years.

*There have been at least five major ice ages in the Earth's history (the Huronian, Cryogenian, Andean-Saharan, late Paleozoic, and the latest Quaternary Ice Age).

**World detail topography has seen in Cenozoic era.