

Class 11th | Geography



Fundamental of Physical Geography

Unit : II - Chapter 2

THE ORIGIN AND EVOLUTION OF THE EARTH

Lecture 4

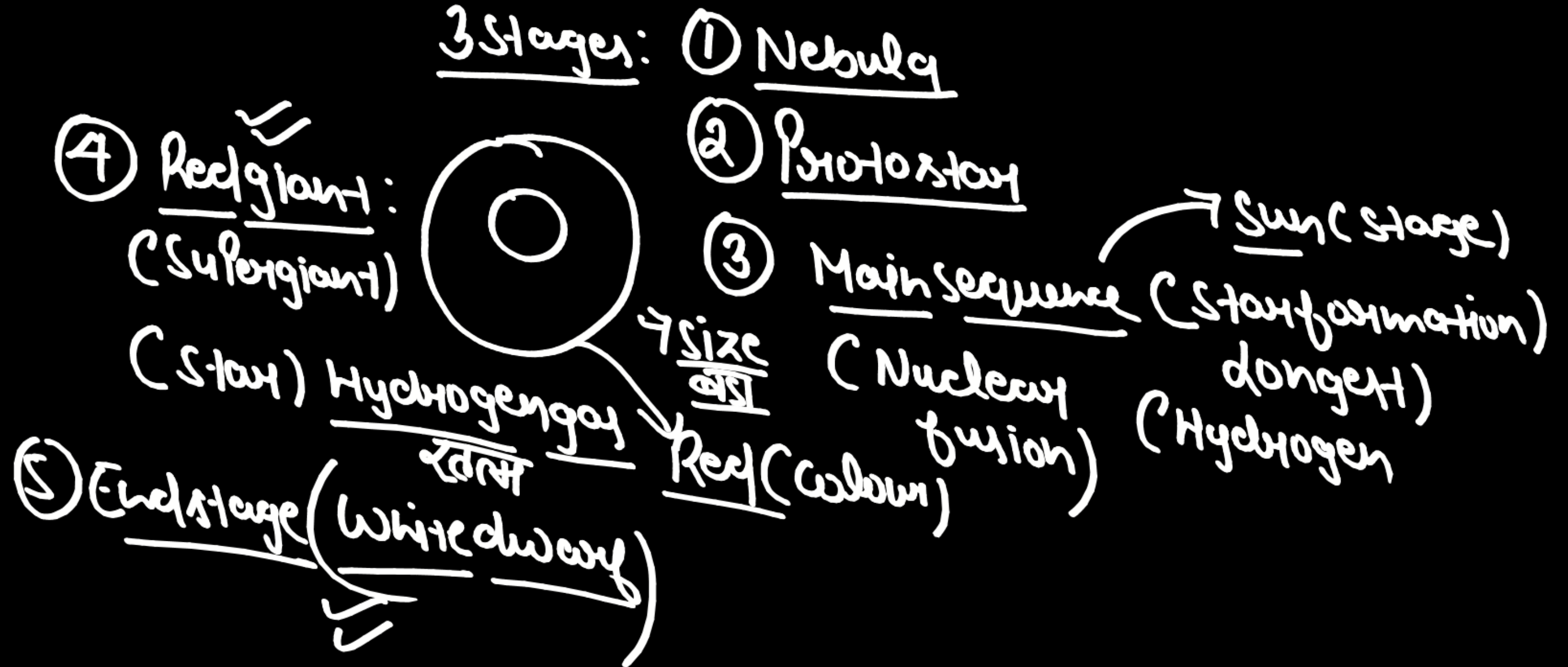


GEOGRAPHY
IS LOVE



🪔 Happy Diwali 🪔

Stages of Star Formation



Stages of Star Formation

light'year

Initial stage: Different density
(IMP)
Galaxy Diameter

80,000-1,500,000
light yrs.

gravitational force
(आकर्षण)

Sunlight

Earth

boxes for development of galaxies was
formed

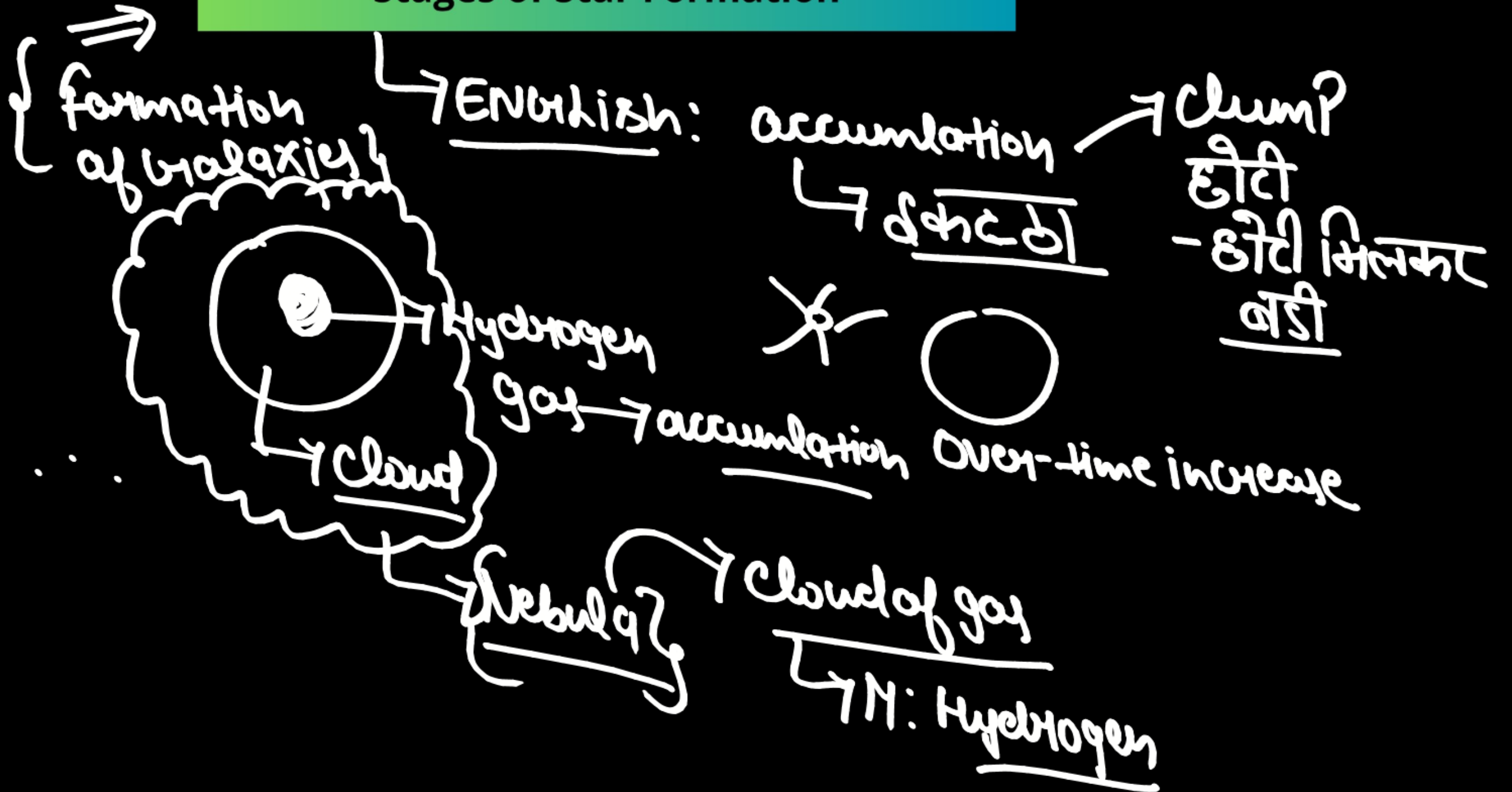
light (3 daich)

$9.461 \times 10^{12} \text{ km}$

Galaxy: \rightarrow Millions of stars
Milkyway



Stages of Star Formation



→ Stage-1

Repeat

Stages of Star Formation

of Planets →

Crust
Mantle
<u>CORE</u>

→ Stars are localized dump of gases within the Nebula.

→ The gravitational force leads to the formation of core. ↑ Core

→ Gas cloud & huge Rotating Disc of cloud
Dust developed around the gas core.


Condensed: Cool down: (Gas) → liquid

Condensation

Cloud of gases ∘ Gravitational force

(JH)
↓
DS

Disc
↳ Cone → Dense



Crust

Mantle

Core

- (i) In the beginning, all matter forming the universe existed in one place in the form of a "tiny ball" (singular atom) with an unimaginably small volume, infinite temperature and infinite density.
- (ii) At the Big Bang the "tiny ball" exploded violently. This led to a huge expansion. It is now generally accepted that the event of big bang took place 13.7 Billion years before the present. The expansion continues even to the present day. As it grew, some energy was converted into matter. There was Stor: 5-6 rapid expansion within fractions of a second after the bang. Thereafter, the expansion has slowed down. Within first three minutes from the Big Bang event, the first atom began to form.
- (iii) Within 300,000 years from the Big Bang, temperature dropped to 4,500 K (Kelvin) and gave rise to atomic matter. The universe became transparent.

cloud called *nebula*. Eventually, growing nebula develops localised clumps of gas. These clumps continue to grow into even denser gaseous bodies, giving rise to formation of stars. The formation of stars is believed to have taken place some 5-6 billion years ago.

A light year is a measure of distance and not of time. Light travels at a speed of 300,000 km/second. Considering this, the distances the light will travel in one year is taken to be one light year. This equals to 9.461×10^{12} km. The mean distance between the sun and the earth is 149,598,000 km. In terms of light years, it is 8.311 minutes.

Formation of Planets

The following are considered to be the stages in the development of planets :

- (ii) The stars are localised lumps of gas within a nebula. The gravitational force within the lumps leads to the formation of a core to the gas cloud and a huge rotating disc of gas and dust develops around the gas core.

44

N.E

{ Monsoon }

De

=

Stars

Galaxies

{ Hydrogen }

Helium

90+

[Gases Cloud]

Cohesion

Stick

(GTS)



3 MARKS

IMP

- (ii) In the next stage, the gas cloud starts getting condensed and the matter around the core develops into small-rounded objects. These small-rounded objects by the process of cohesion develop into what is called planetesimals. Larger bodies start forming by collision, and gravitational attraction causes the material to stick together. Planetesimals are a large number of smaller bodies.
- (iii) In the final stage, these large number of small planetesimals accrete to form a few large bodies in the form of planets.

EVOLUTION OF THE EARTH

Do you know that the planet earth initially was a barren, rocky and hot object with a thin atmosphere of hydrogen and helium. This is far from the present day picture of the earth. Hence, there must have been some events—processes, which may have caused this change from rocky, barren and hot earth to a beautiful planet with ample amount of water and conducive atmosphere favouring the existence of life. In the following section, you will find out how the period, between the 4,600 million years and the present, led to the evolution of life on the surface of the planet.

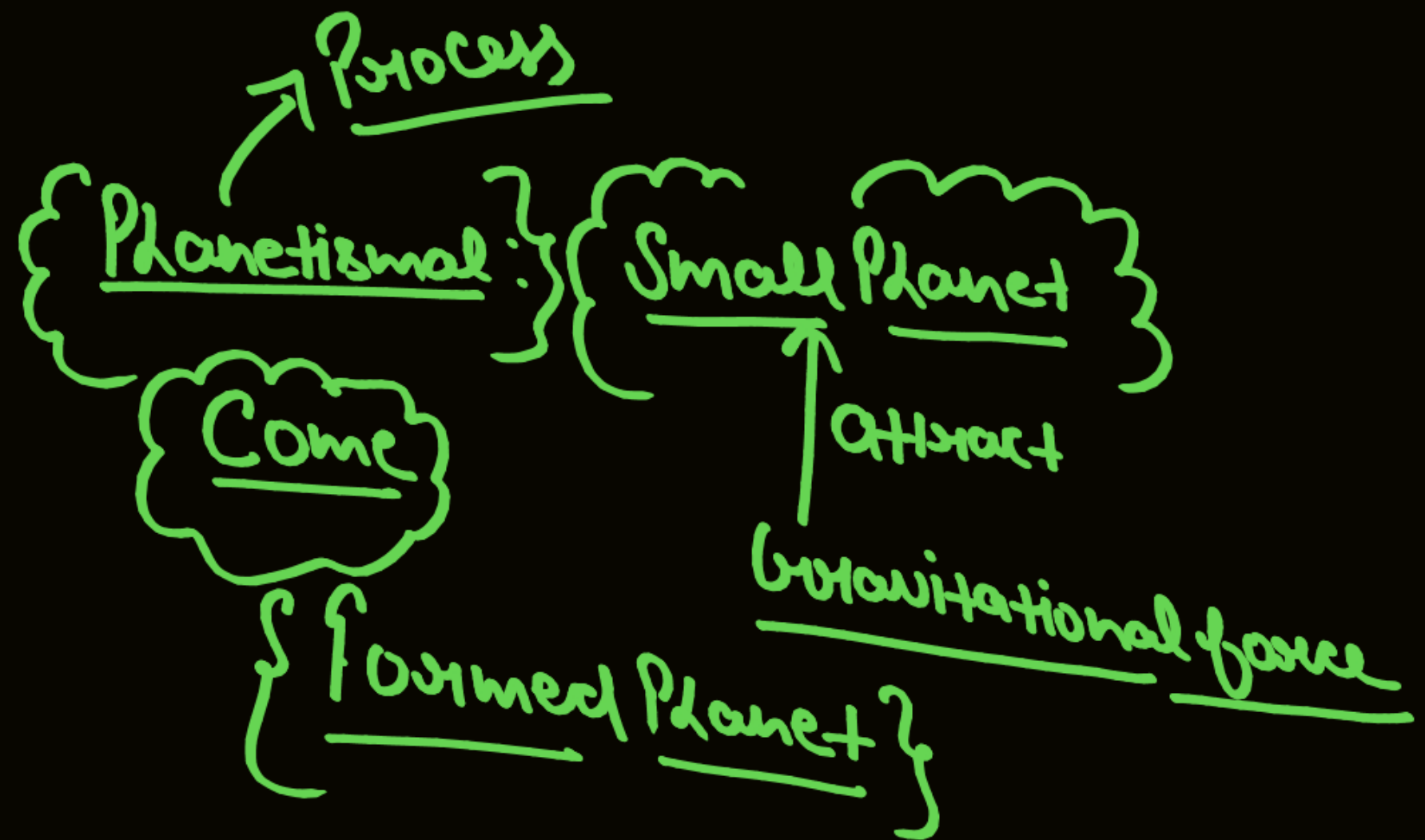
The earth has a layered structure. From the outermost end of the atmosphere to the

iron) to sink towards the centre of the earth and the lighter ones to move towards the surface. With passage of time it cooled further and solidified and condensed into a smaller size. This later led to the development of the outer surface in the form of a crust. During the formation of the moon, due to the giant impact, the earth was further heated up. It is through the process of differentiation that the earth forming material got separated into different layers. Starting from the surface to the central parts, we have layers like the crust, mantle, outer core and inner core. From the crust to the core, the density of the material increases. We shall discuss in detail the properties of each of this layer in the next chapter.

Evolution of Atmosphere and Hydrosphere

The present composition of earth's atmosphere is chiefly contributed by nitrogen and oxygen. You will be dealing with the composition and structure of the earth's atmosphere in Chapter 8.

There are three stages in the evolution of the present atmosphere. The first stage is marked by the loss of primordial atmosphere. In the second stage, the hot interior of the earth contributed to the evolution of the atmosphere. Finally, the composition of the atmosphere was modified by the living world through the



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