

Handout 1 (purple) Earth's Formation

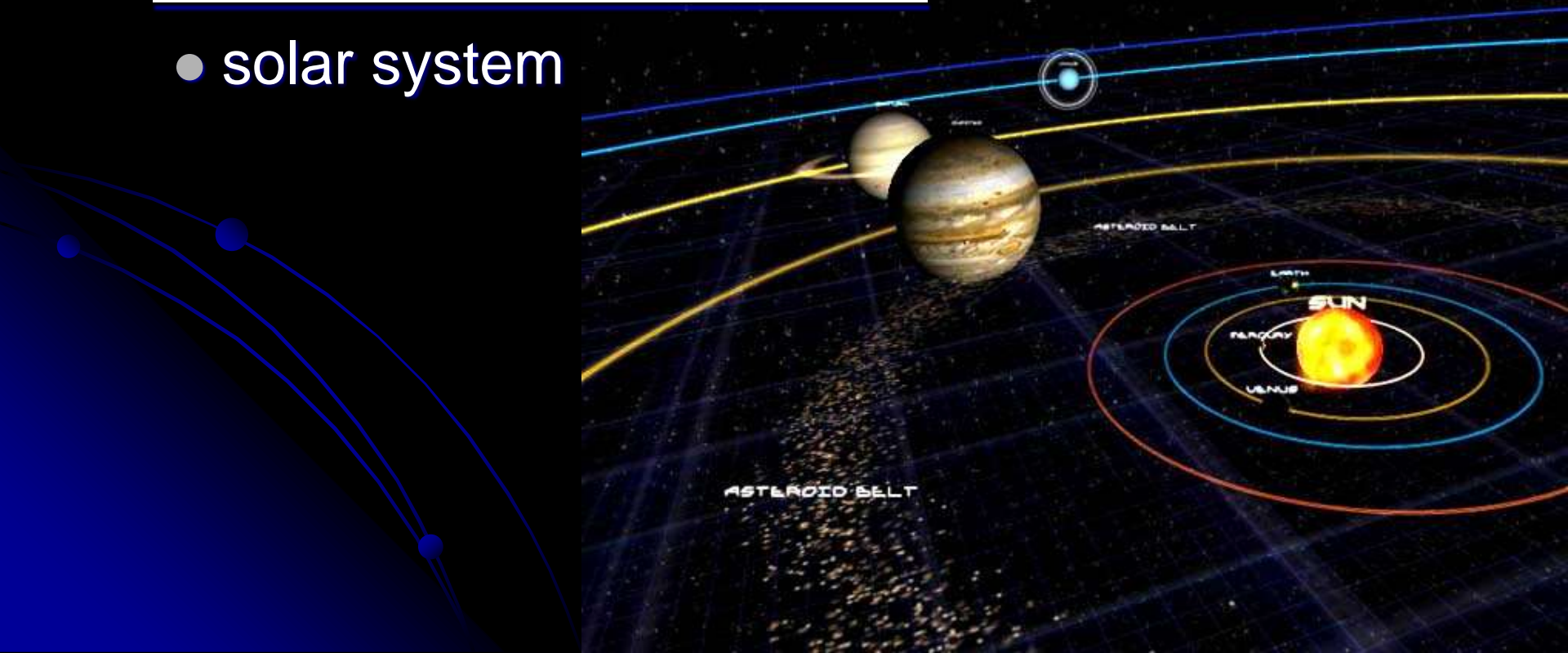
Formation of the Solar System

A decorative graphic in the bottom-left corner consisting of three curved blue lines of varying thickness, each ending in a small blue dot. The lines curve from the bottom-left towards the center of the slide.

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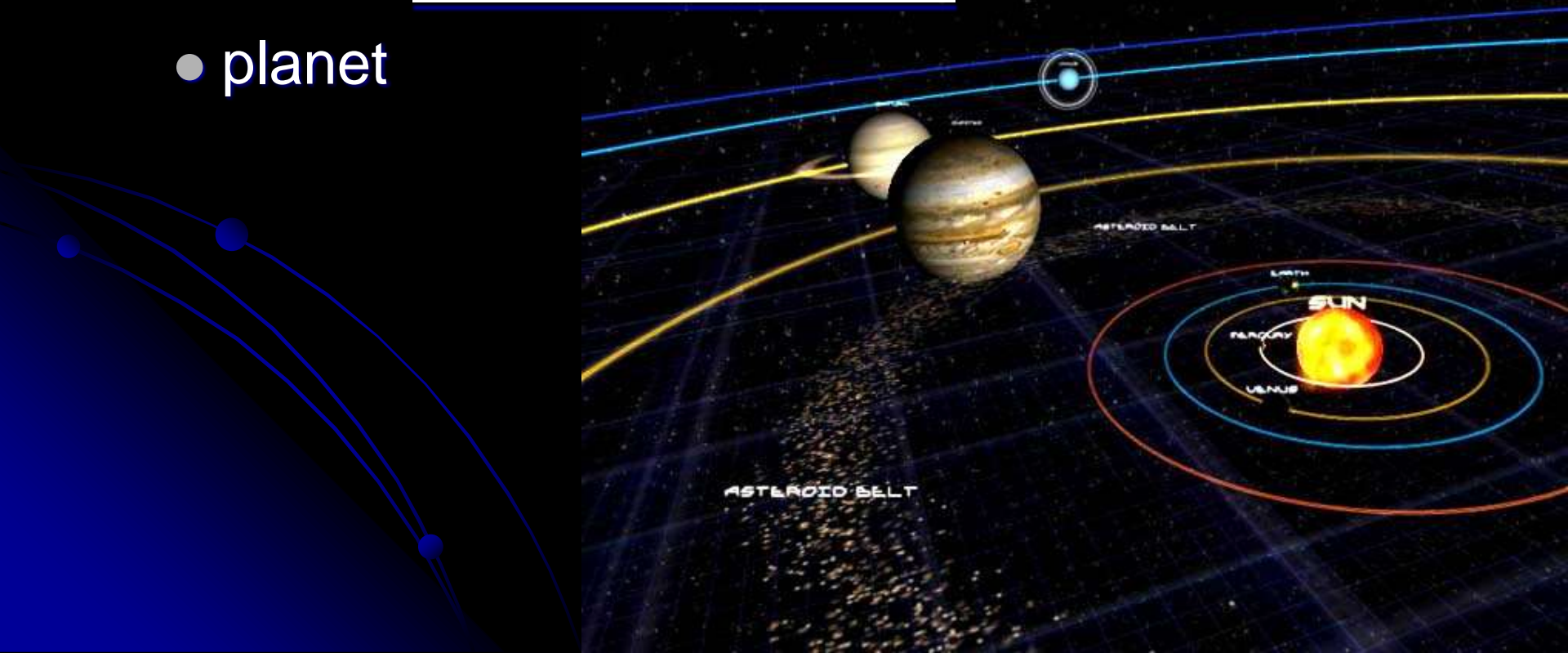
- The sun and all of the planets and other bodies that revolve around it make up the

- solar system



2

- Any primary body that orbits the sun, or a similar body that orbits another star, is called a _____.
- planet



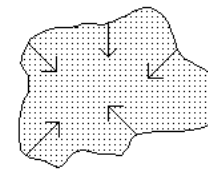
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- In 1796, the French mathematician Pierre-Simon, marquis de Laplace, advanced the nebular hypothesis to explain the origins of the solar system.

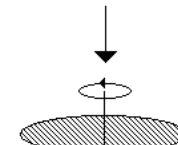
- nebular hypothesis



Nebular Hypothesis

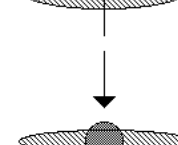


self-gravity contracts a gas cloud



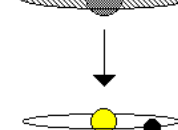
conservation of angular momentum
pulls cloud into a disk

disk begins to rotate



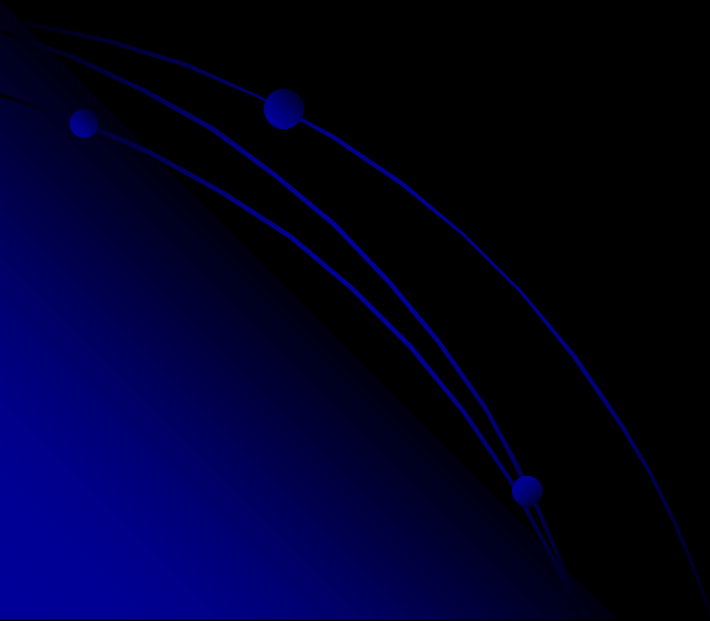
central mass forms (proto-Sun)

centrifugal force balances gravitational
forces and a ring forms



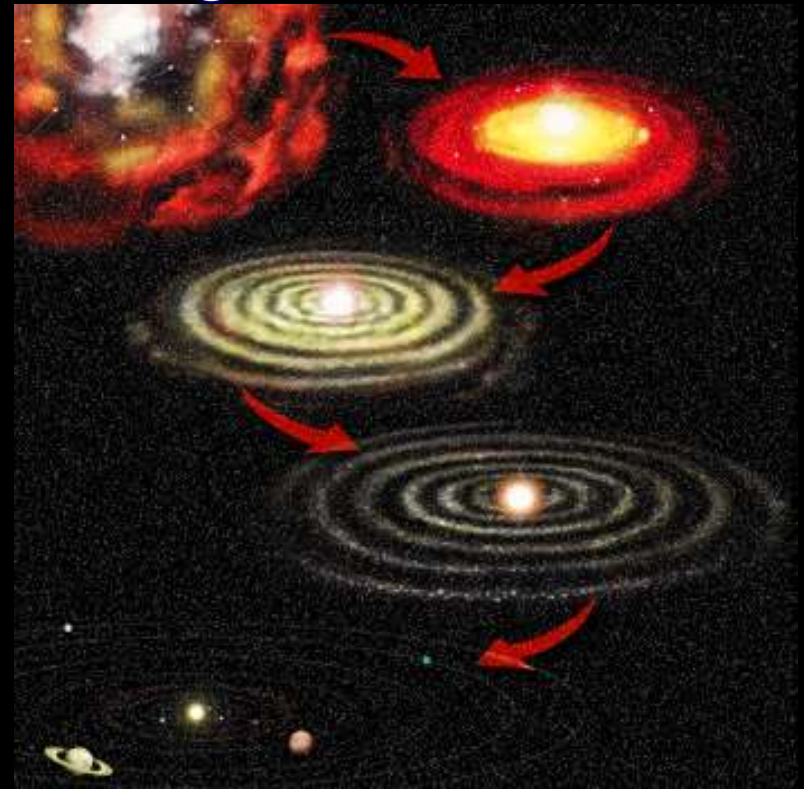
ring forms into a planet

THE NEBULAR HYPOTHESIS



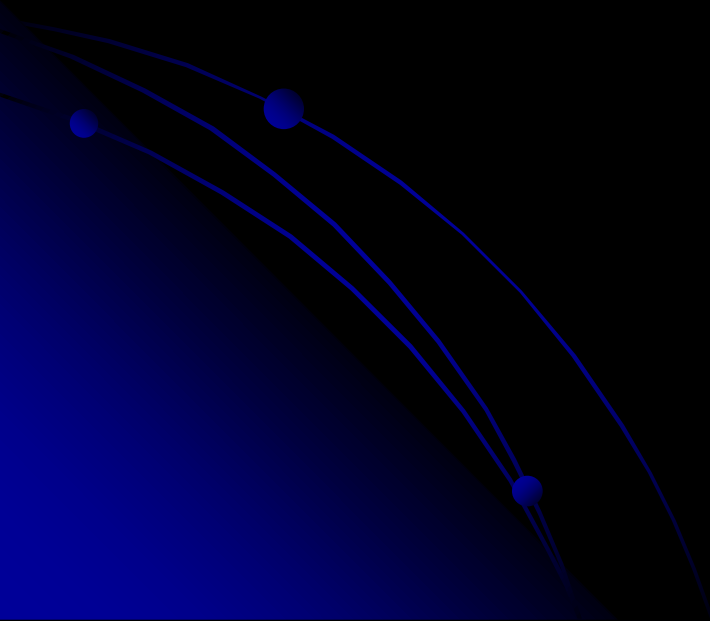
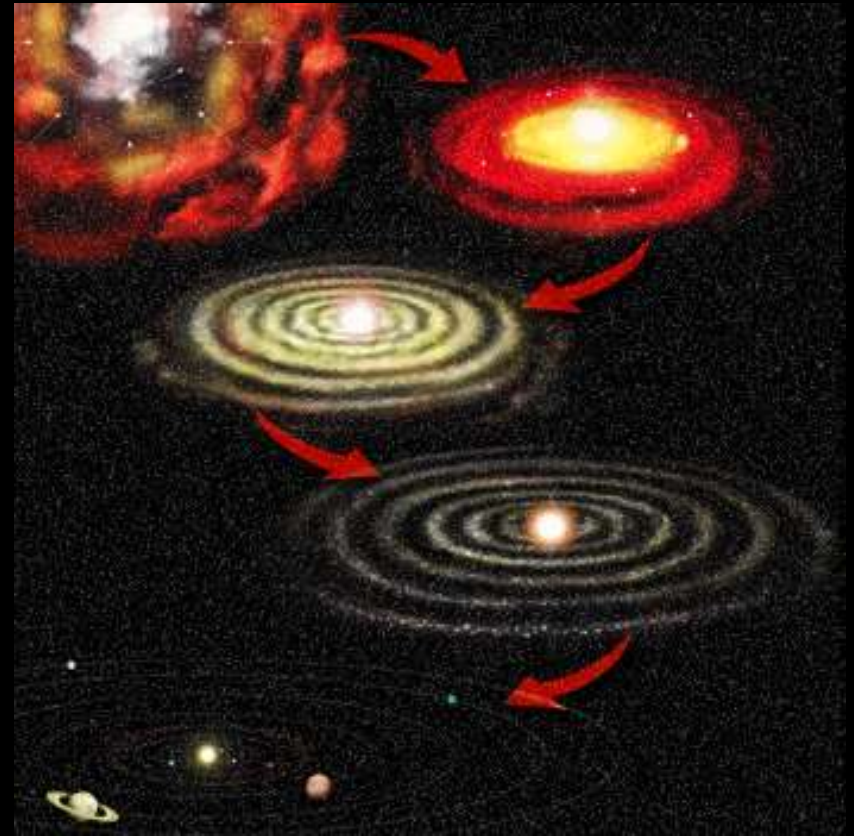
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- Laplace's hypothesis states that the sun and the planets condensed at about the same time out of a rotating cloud of dust and gas called a
 - B. nebula



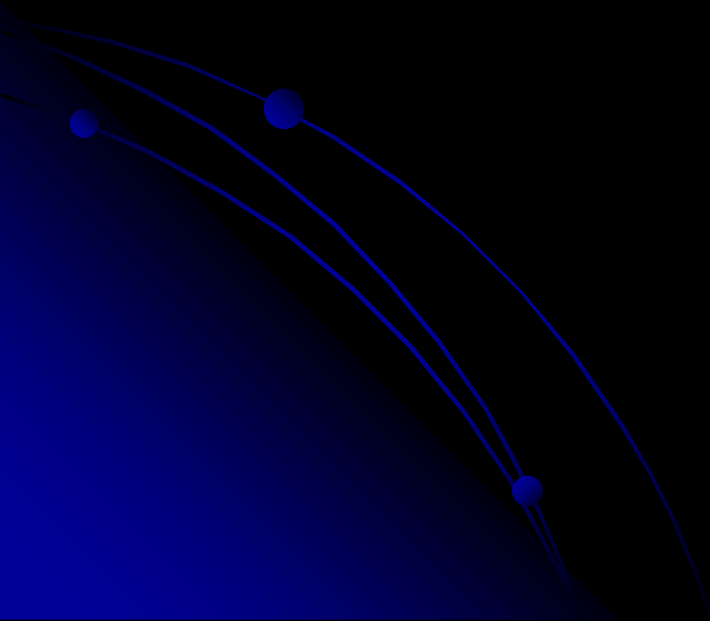
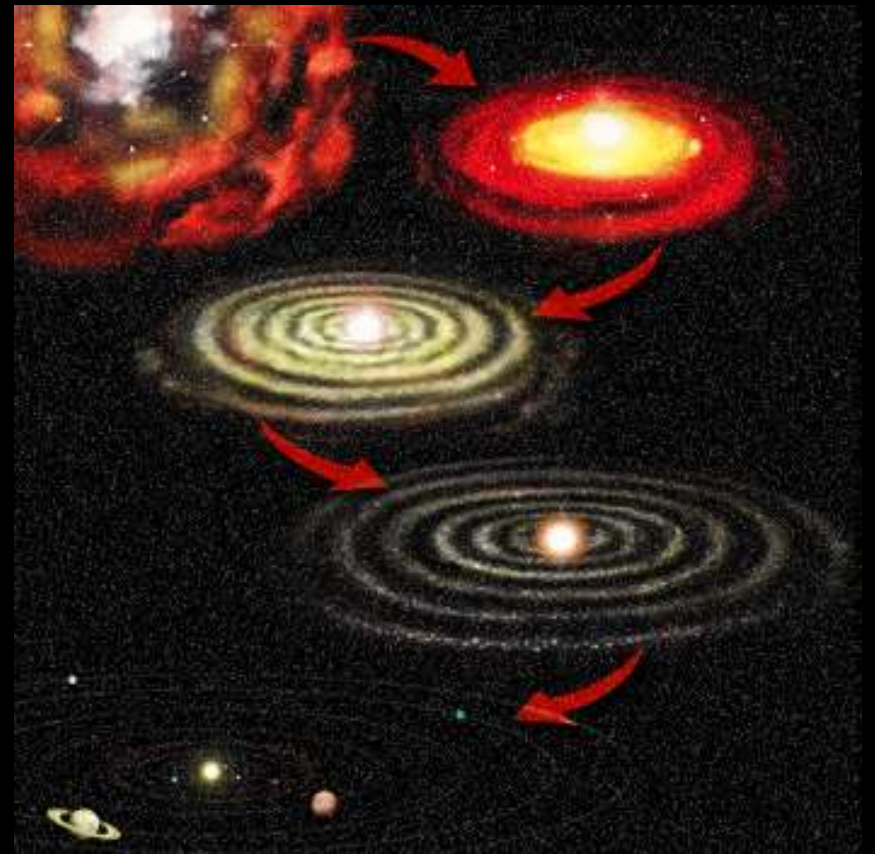
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- The rotating cloud of dust and gas from which our solar system is thought to have formed is called the
 - A. solar nebula



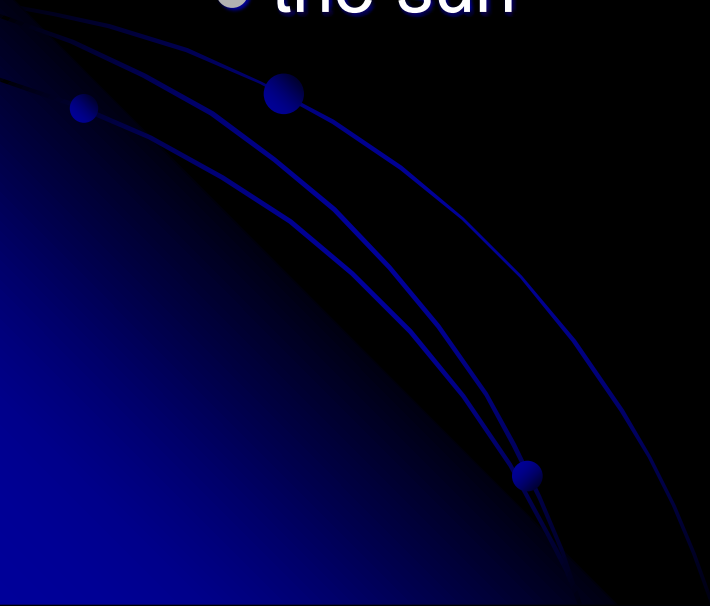
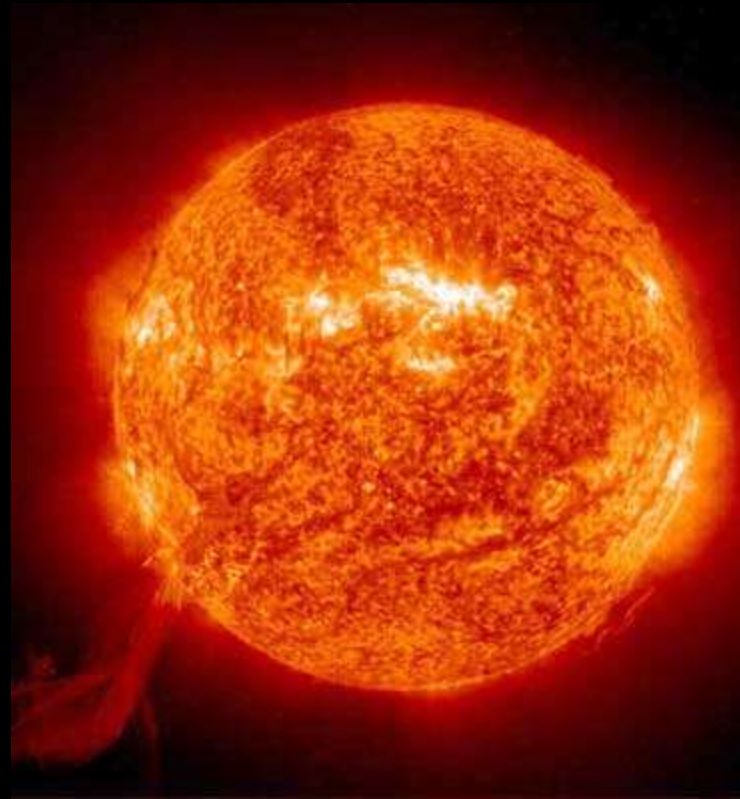
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- Energy from collisions and pressure from gravity caused the center of the solar nebula to become
 - D. hotter and denser



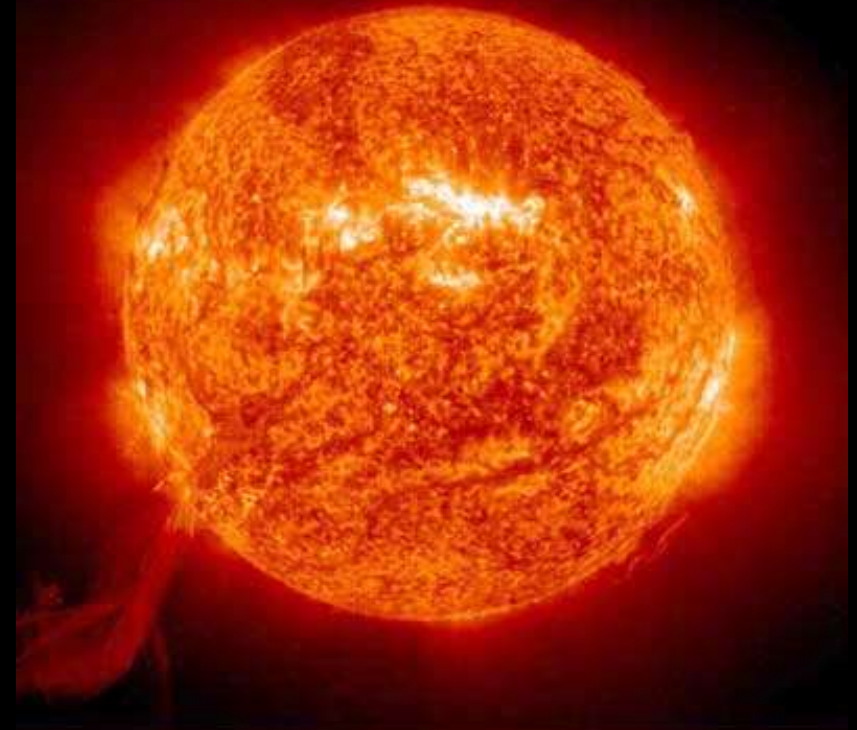
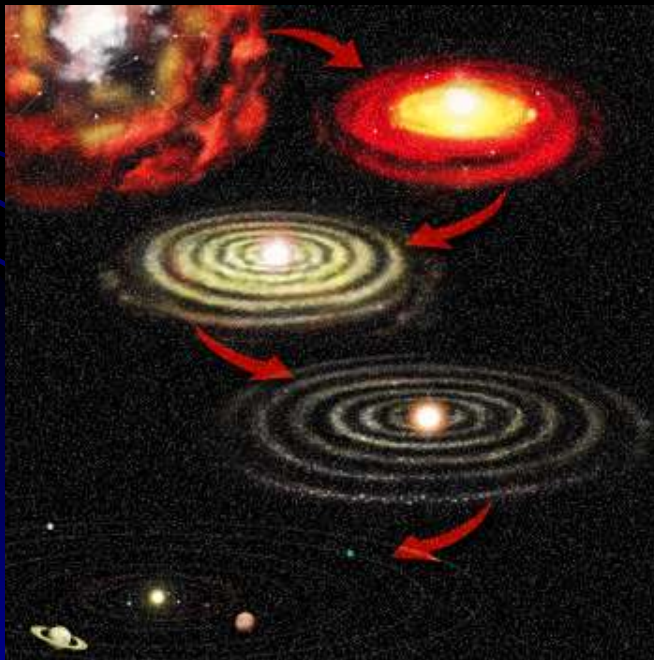
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- Which of the following formed when the temperature at the center of the nebula reached about 10,000,000 °C and hydrogen fusion began?
 - the sun

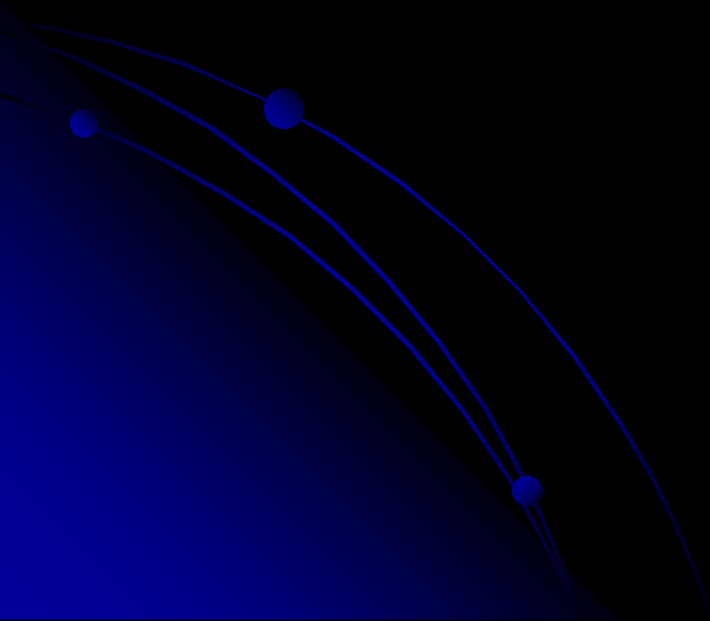


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- How much of the matter that was contained in the solar nebula makes up the sun?
 - B. about 99%

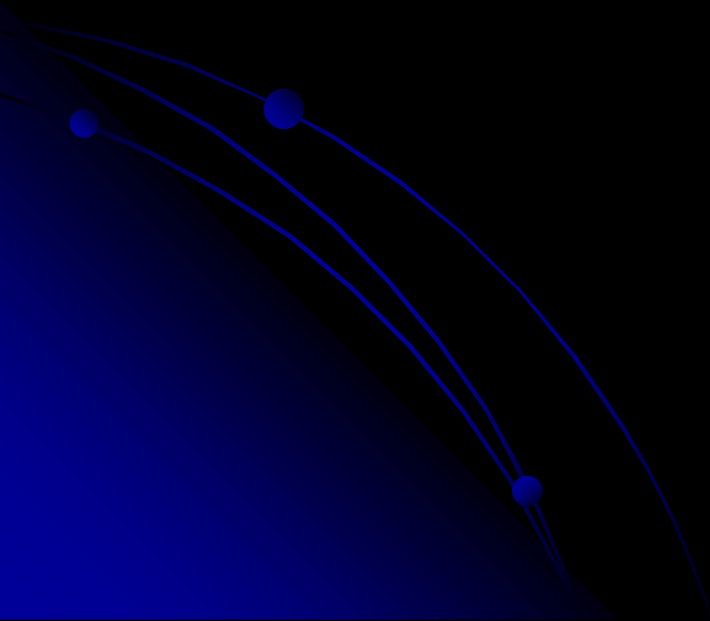


FORMATION OF THE PLANETS



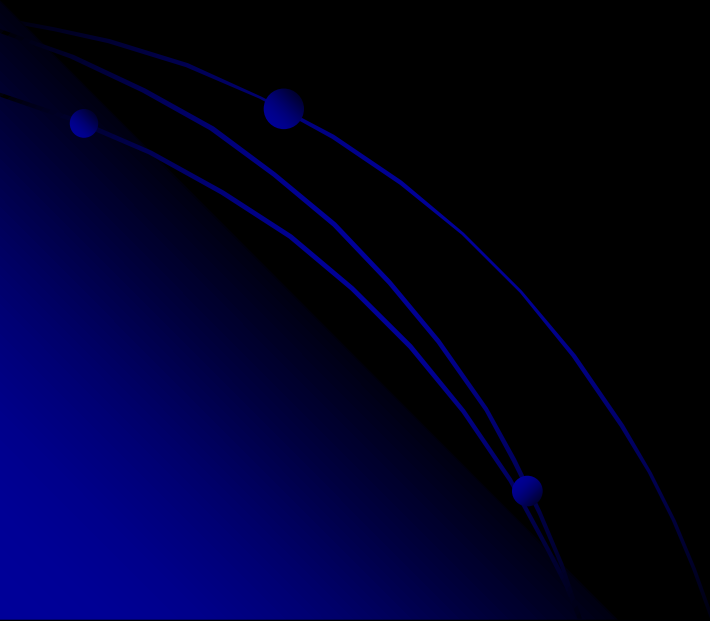
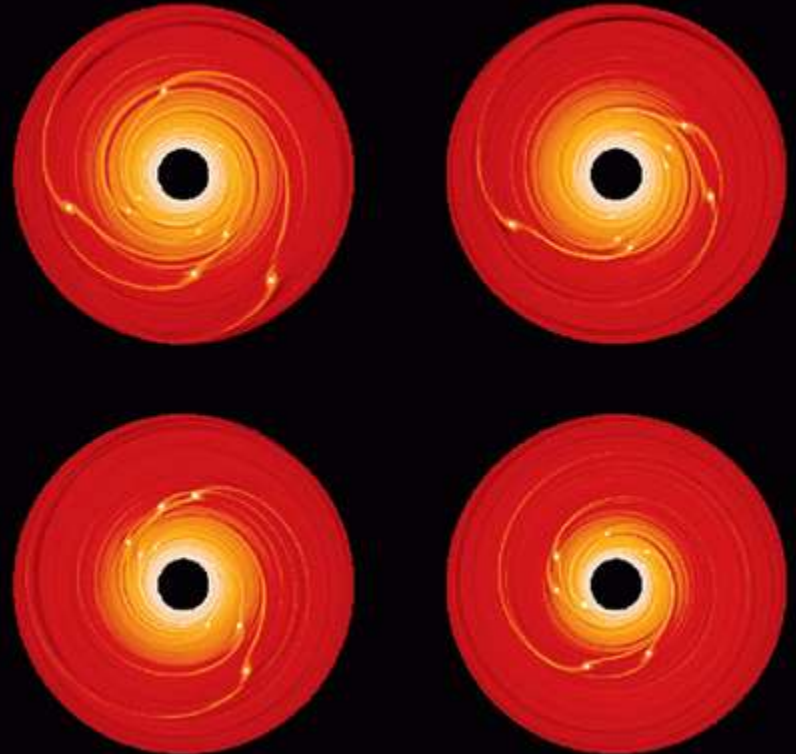
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- Small bodies from which a planet originated in the early development of the solar system are called
 - B. planetesimals



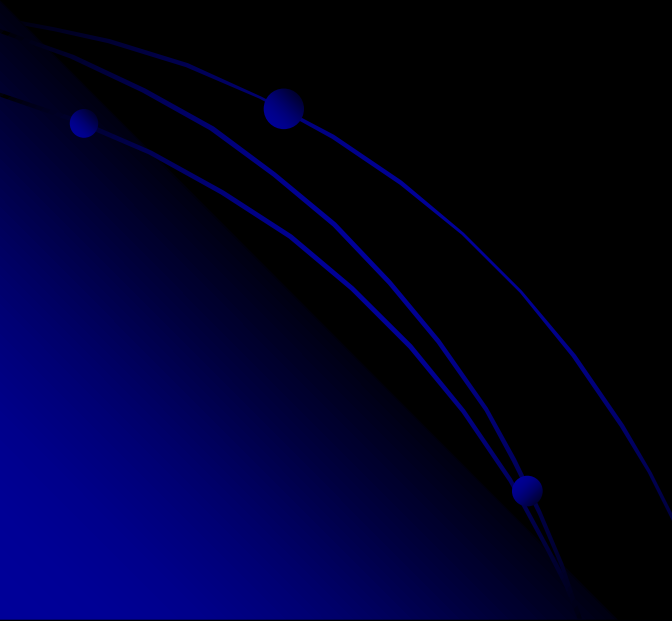
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- Some planetesimals joined together through collision and through the force of gravity to form larger bodies called
 - A. protoplanets



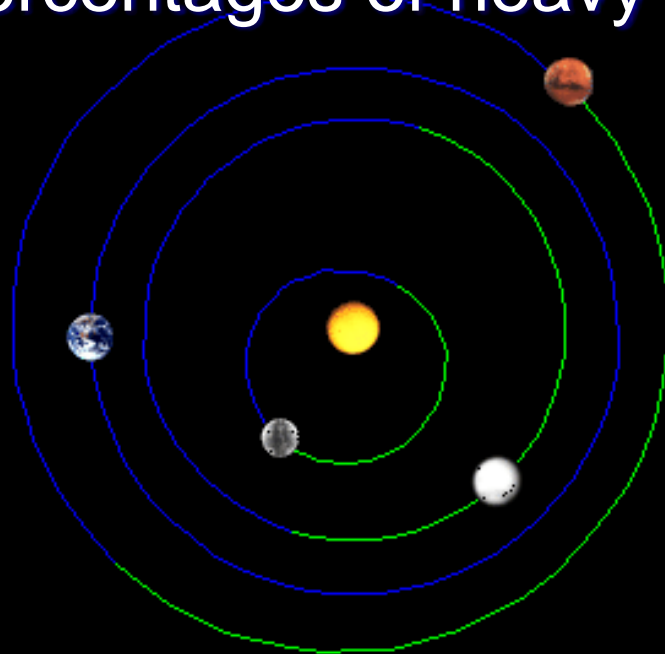
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- The smaller bodies that orbit the planets are called
 - B. moons.



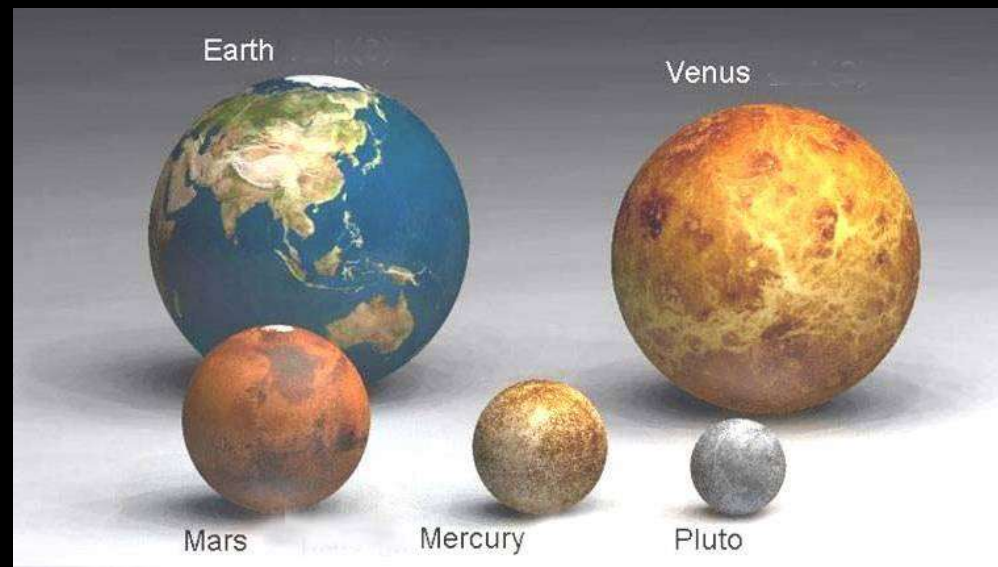
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- Why are Mercury, Venus, Earth, and Mars called the *inner* planets?
 - They are closest to the Sun and they contained large percentages of heavy elements
 - Iron
 - nickel



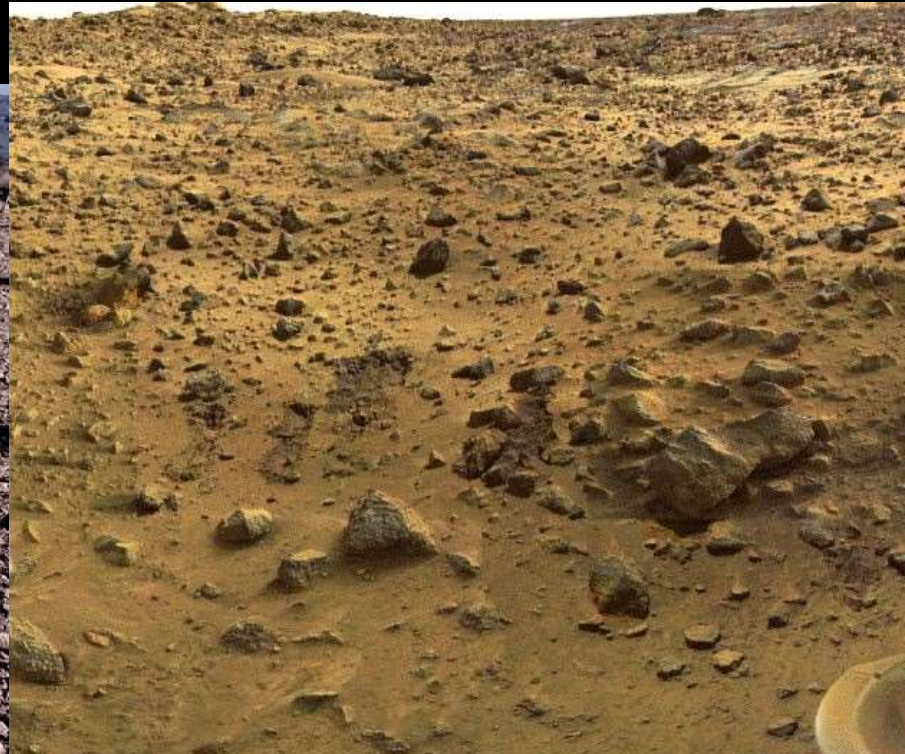
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- Why did the inner planets, which contained large percentages of heavy elements such as iron and nickel, lose their less dense gases?
 - Gravity of the inner planets was not enough to hold the gases.



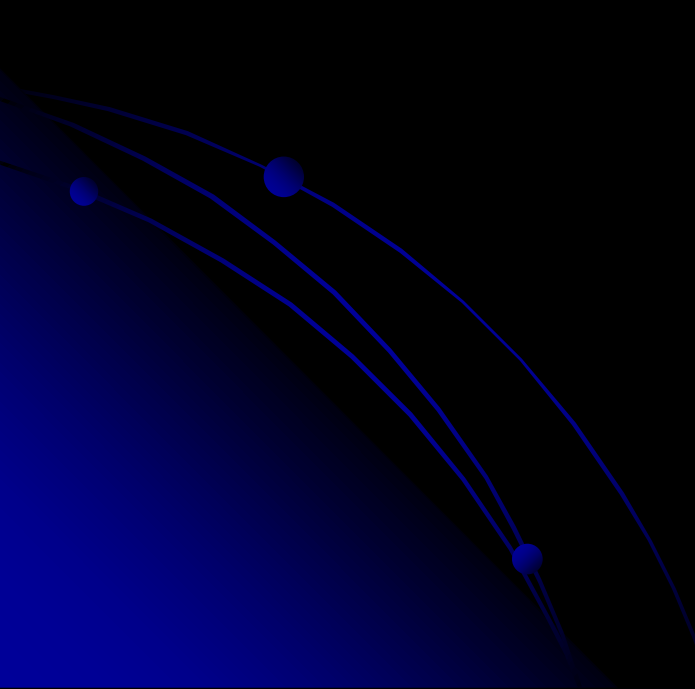
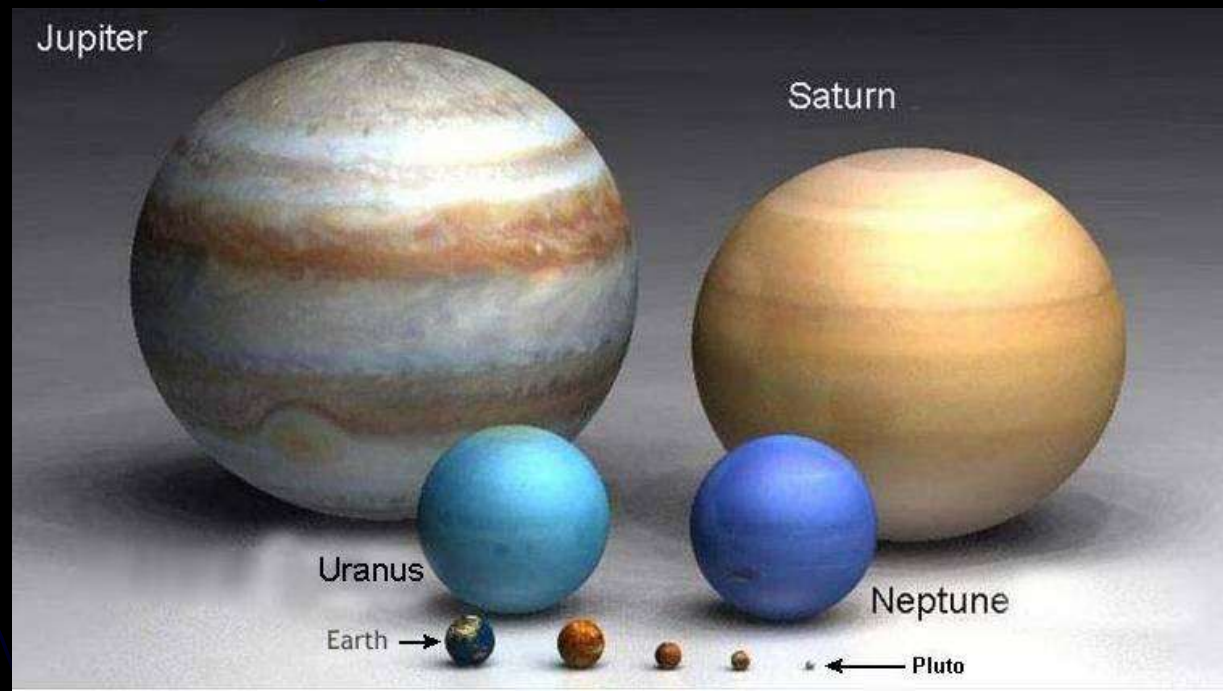
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- How do the surfaces of the inner planets compare with that of Earth today?
 - They have solid surfaces that are similar to Earth's surface.



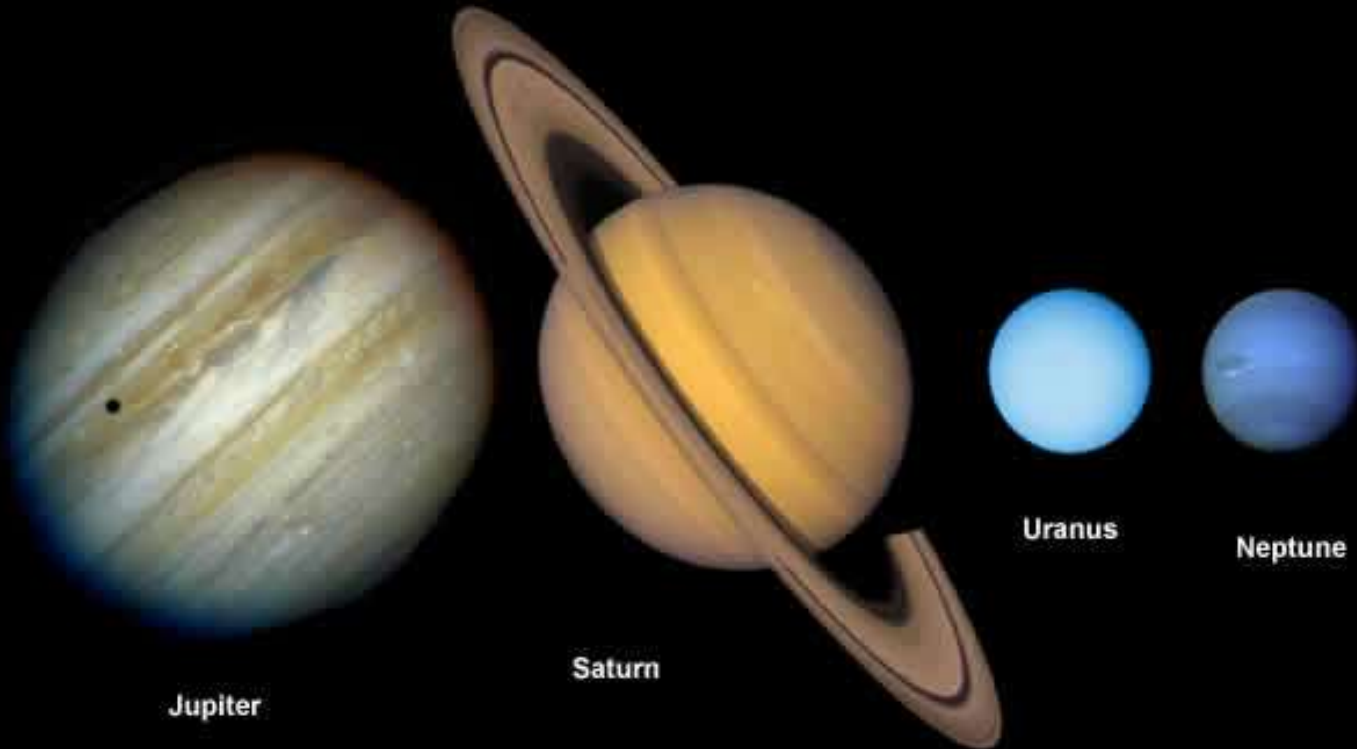
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- How do the inner planets differ from the outer planets?
 - The inner planets are smaller, rockier, and denser than the outer planets.



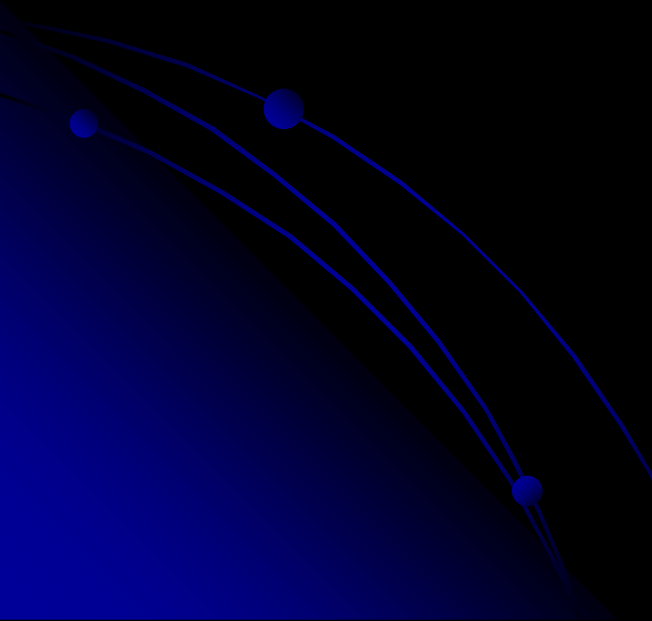
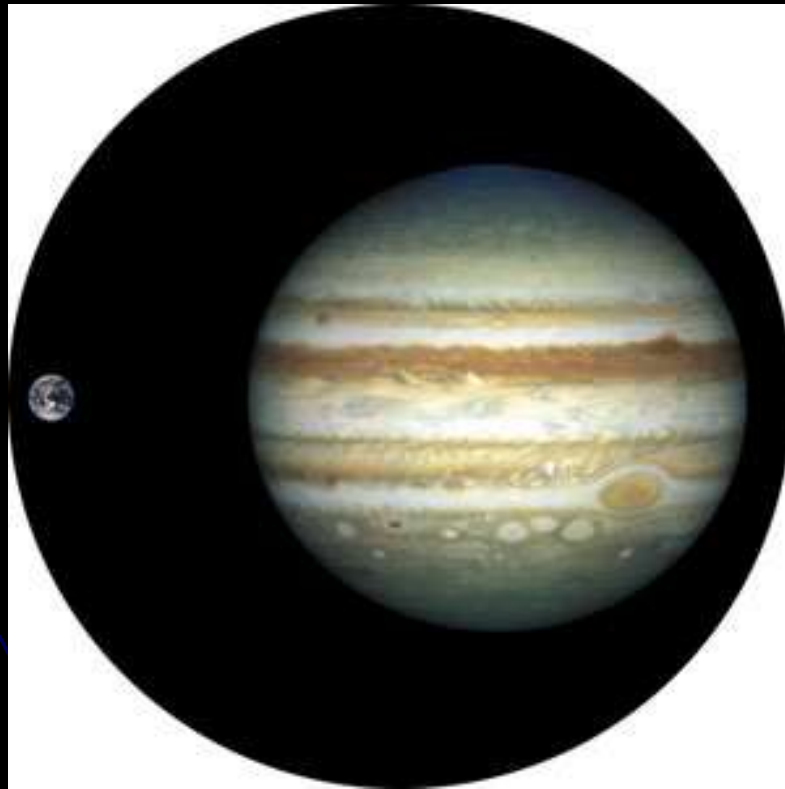
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- Jupiter, Saturn, Uranus, and Neptune are referred to as _____ planets.
 - outer



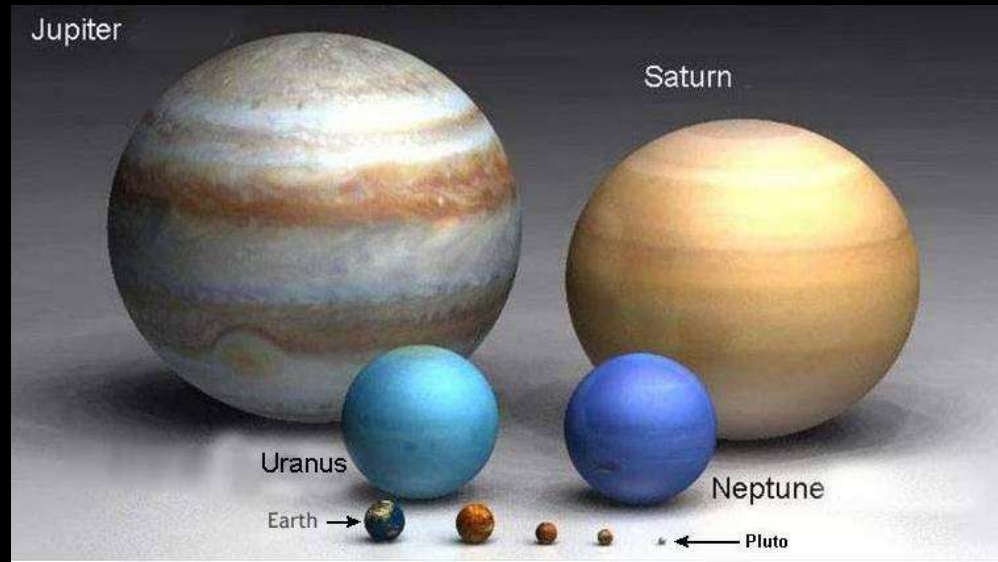
17

- How did distance from the sun affect the formation of the outer planets?
 - They were far from the sun and therefore were cold.



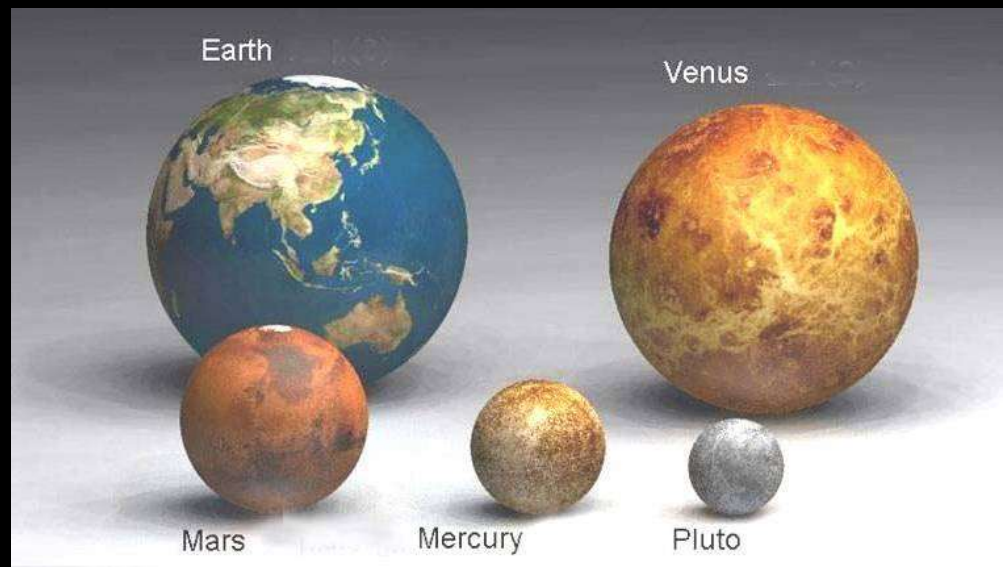
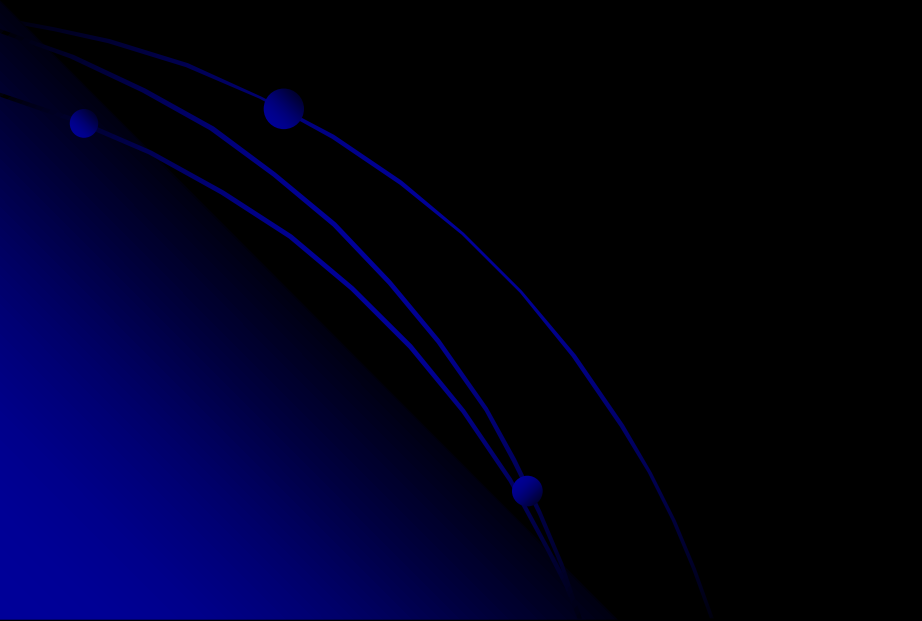
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- Name the three reasons why the outer planets are referred to as *gas giants*.
 1. they are composed mostly of gases
 2. they have low density
 3. they are huge planets



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- Which outer planet is farthest from the sun?
 - Pluto
 - is it still considered a planet today?



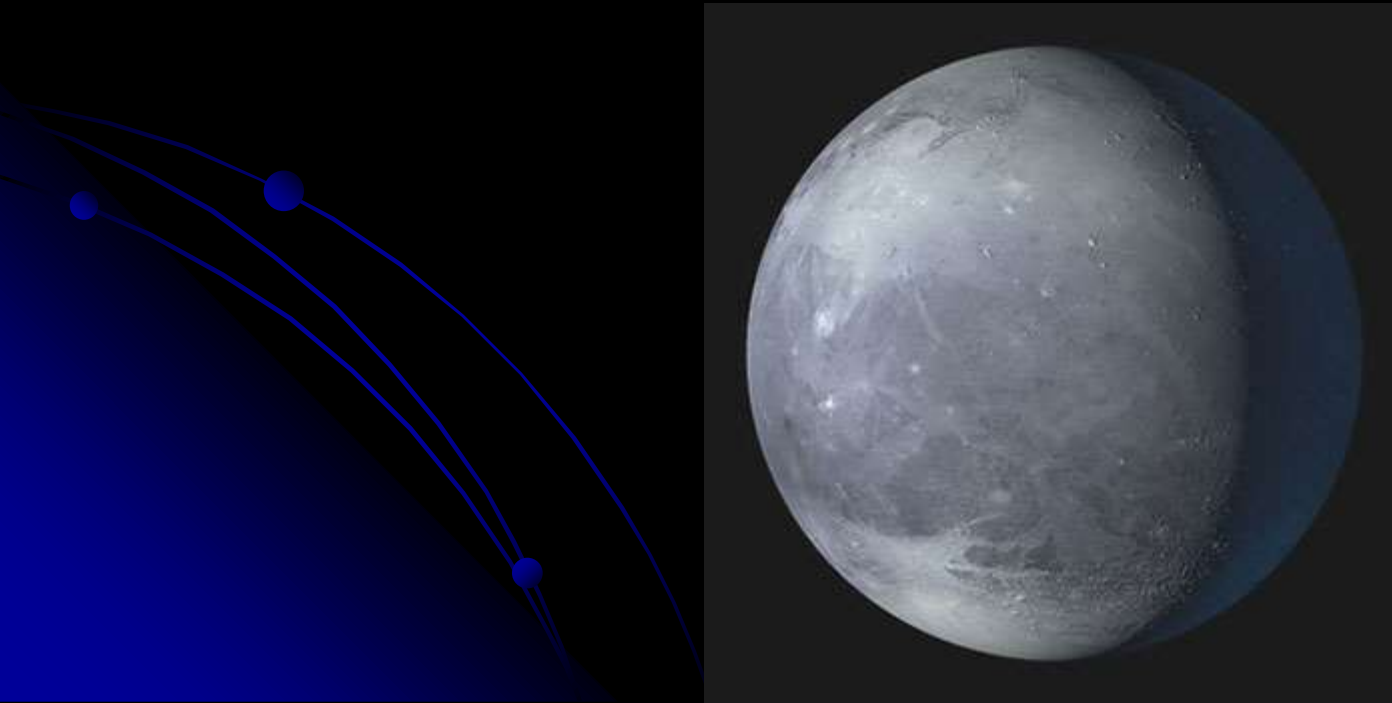
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- In what way does Pluto differ from the other outer planets?
 - it is very small
 - smaller than the Earth's moon
 - it's an ice ball that is made of frozen gases and rock.



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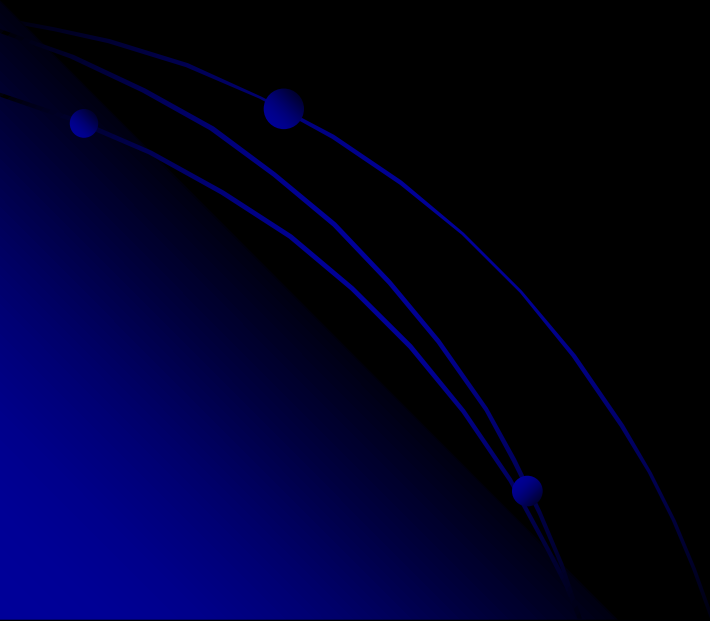
- In what way is Pluto similar to the other outer planets?
 - it is very cold like the other outer planets



- Why do many scientists believe that Pluto should not be classified as a major planet?
 - There are hundreds of objects that are similar to Pluto that exist beyond Neptune's orbit.
 - Scientists think that Pluto is just one of these objects.

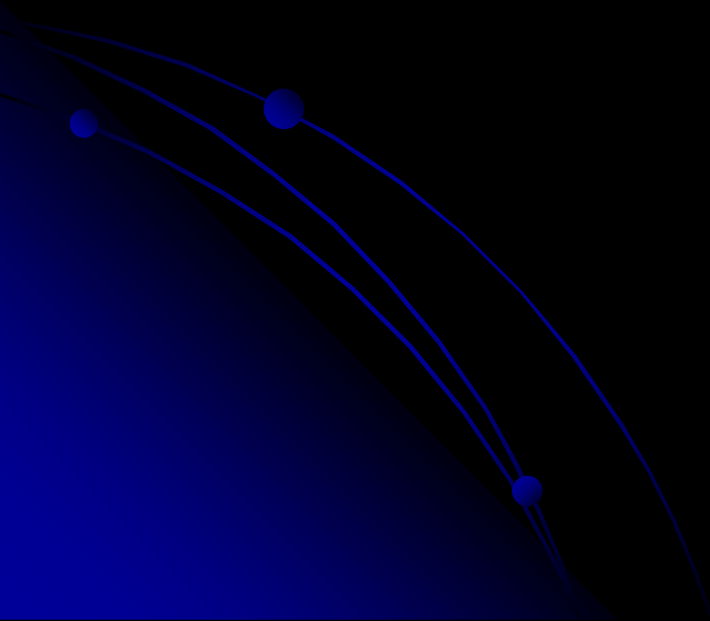


FORMATION OF SOLID EARTH



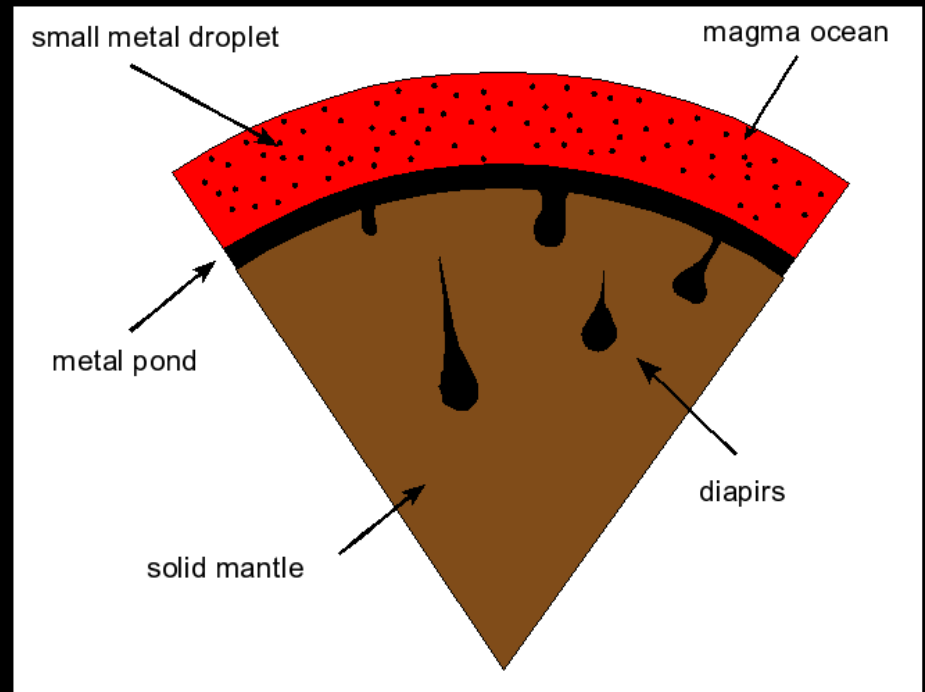
23

- When Earth formed, its high temperature was NOT due to
 - **D:** an irregular orbit that brought it closer to the sun.



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- Dense materials such as molten iron sank to Earth's center and less dense materials were forced to the outer layers in a process called
 - B. differentiation.

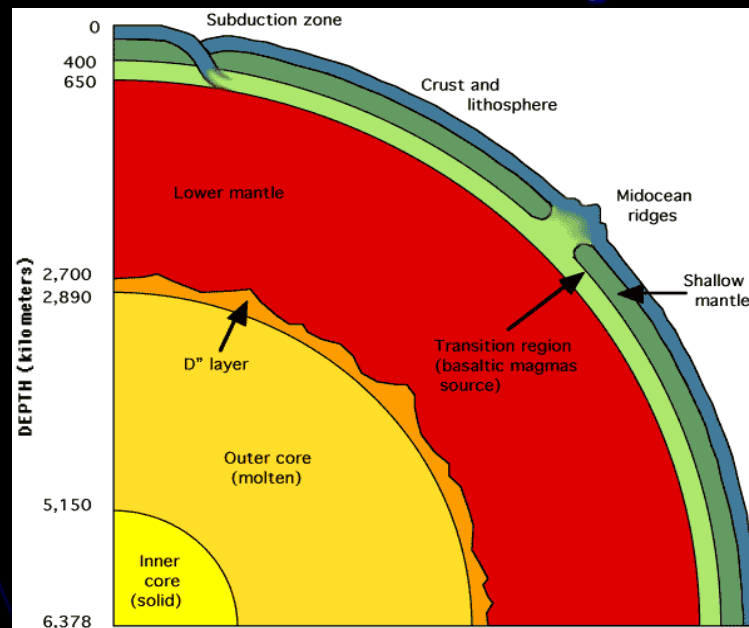


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- Which of the following did NOT form as one of Earth's layers when differentiation occurred?
- **THESE** are the **CORRECT** layers of Earth's

interior

- a. core
- b. mantle
- d. crust



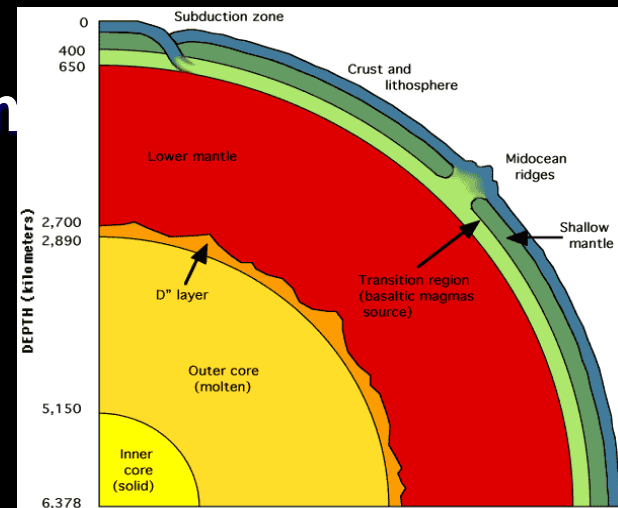
This figure illustrates the differentiation of Earth into layers with distinct physical and compositional properties (same as Figure 4, Chapter 9, in your textbook).

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● Which of the following elements is NOT present in large amounts in Earth's three layers?

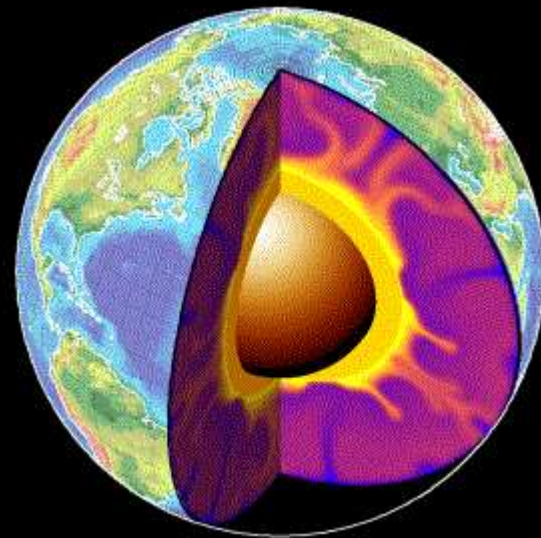
● **THESE elements ARE FOUND in large amounts in Earth's three layers.**

- core: iron and nickel
- mantle: iron and magnesium
- crust: silica
- **SO it is A: gold**

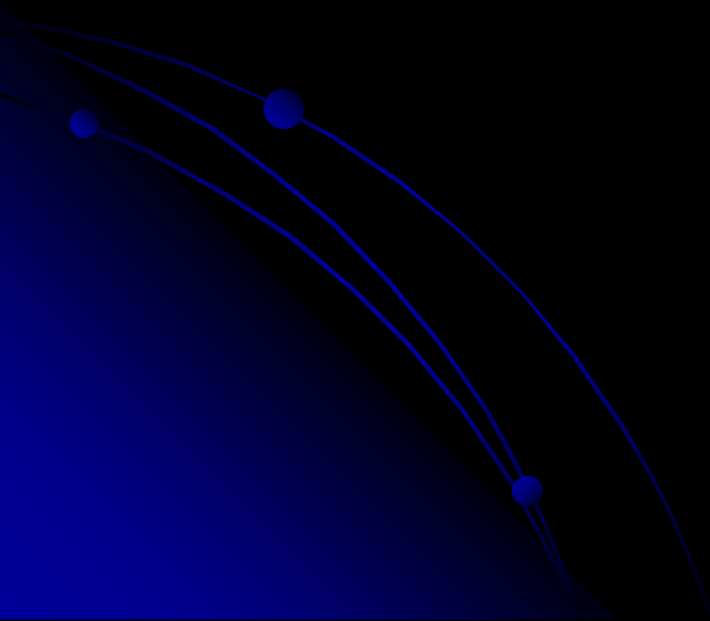


This figure illustrates the differentiation of Earth into layers with distinct physical and compositional properties (same as Figure 4, Chapter 9, in your textbook).

- Earth's surface continued to change as a result of
 - c. the heat in Earth's interior.
 - as well as through impacts
 - and through interactions with the newly formed atmosphere.

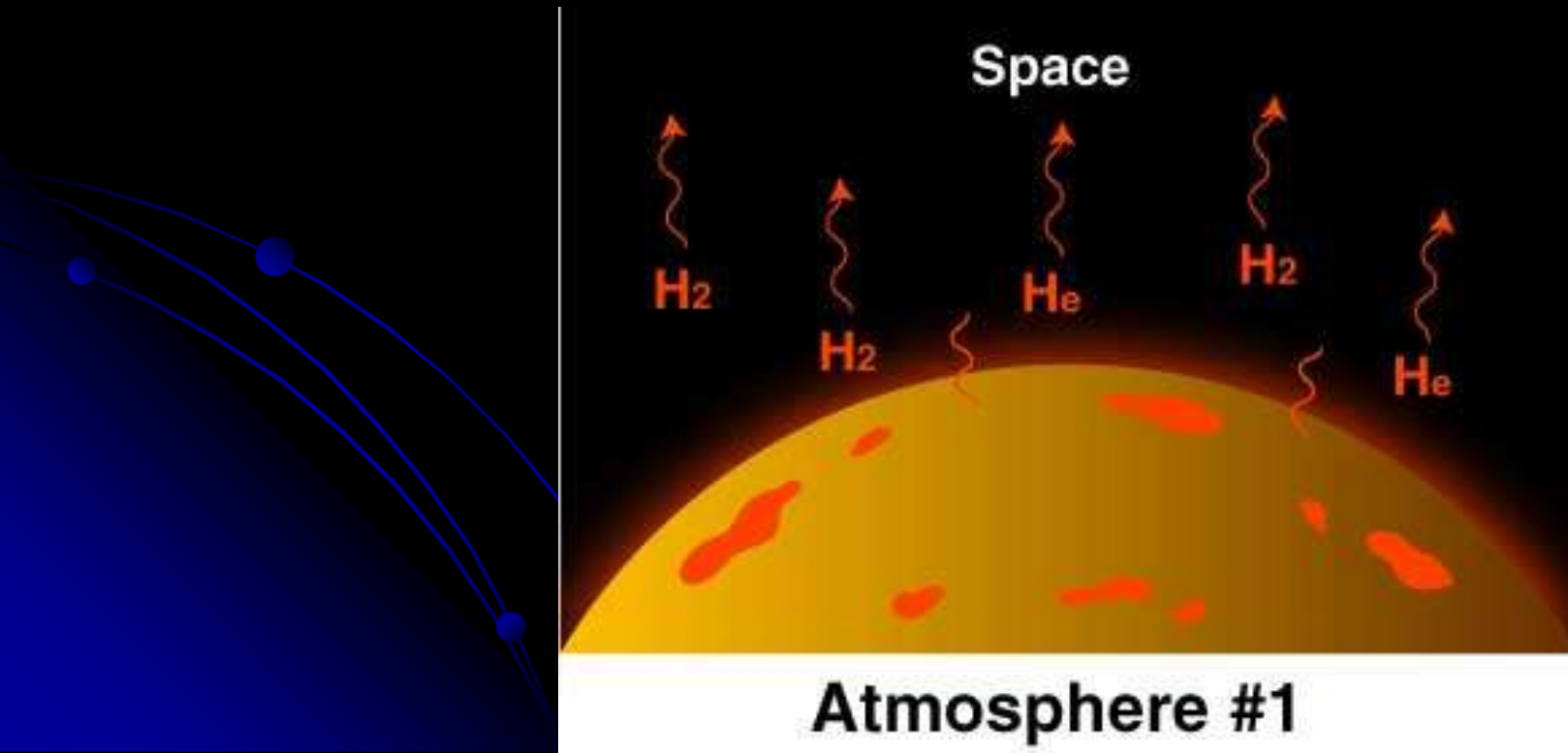


FORMATION OF EARTH'S ATMOSPHERE



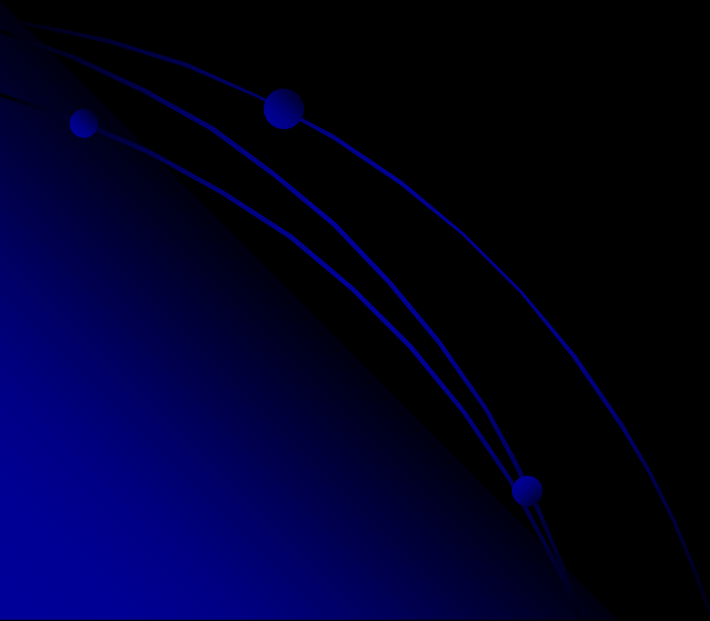
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- The original atmosphere of Earth consisted of
 - B: hydrogen and helium



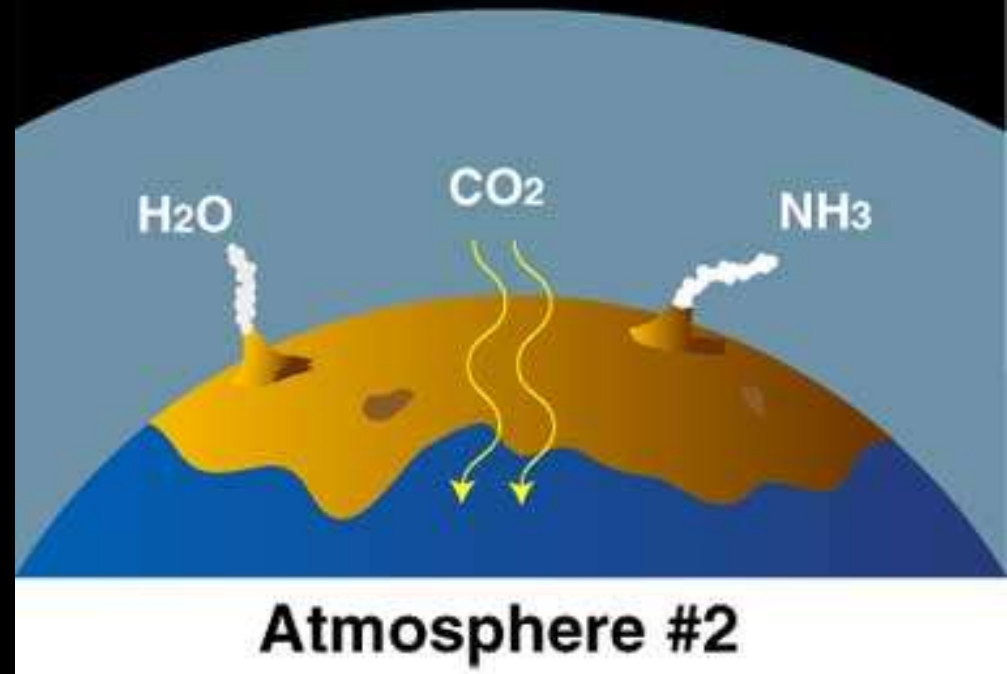
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- Today, hydrogen and helium occur mainly in the
- D: the upper atmosphere.



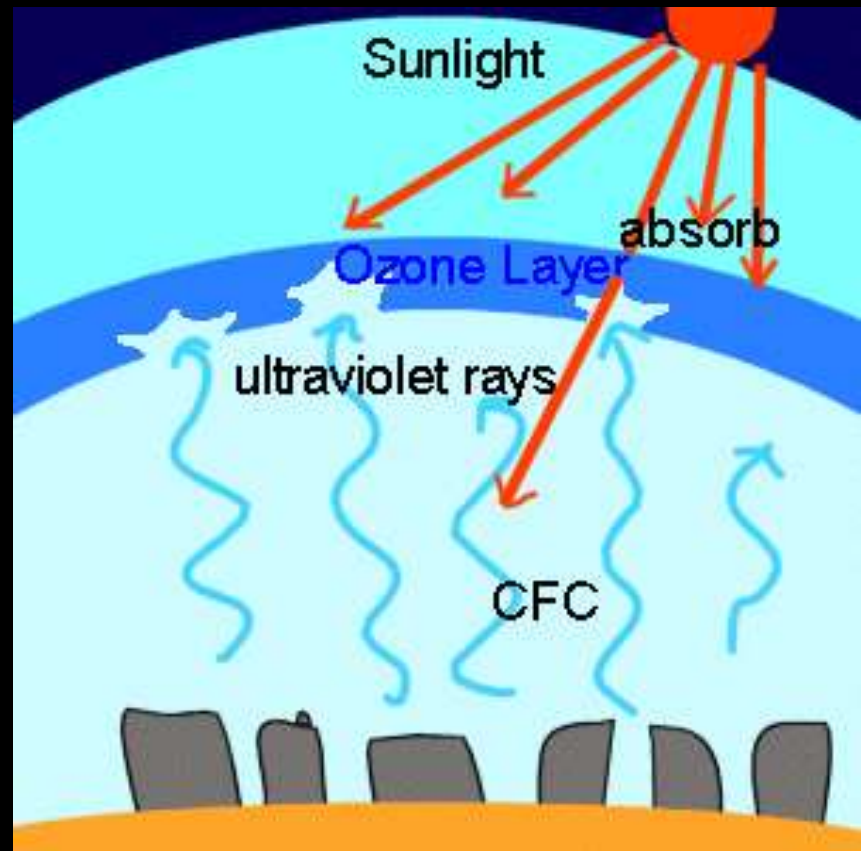
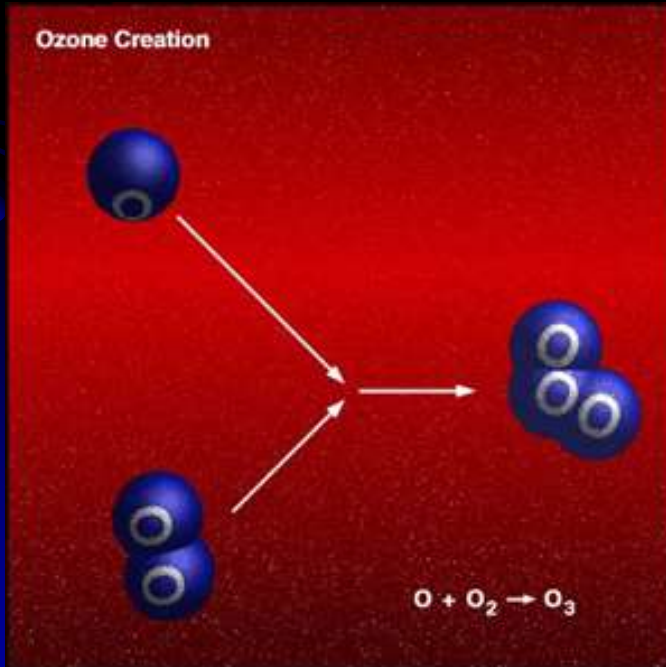
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- Earth's early atmosphere formed when volcanic eruptions released gases in a process called
 - A: outgassing.



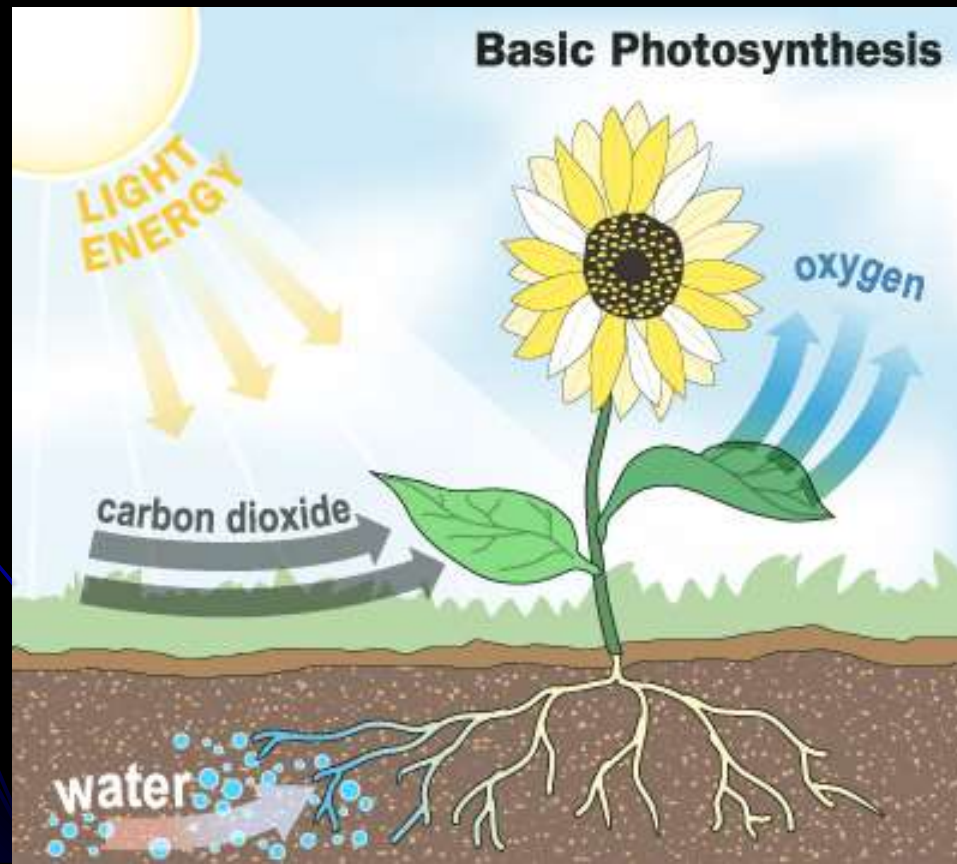
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- What is the molecule that contains three oxygen atoms and collects in Earth's upper atmosphere
 - C: ozone



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- Which byproduct of photosynthesis was released into the atmosphere?
 - Oxygen



- Comet collisions may have contributed a significant amount of _____ to Earth's surface.
 - water



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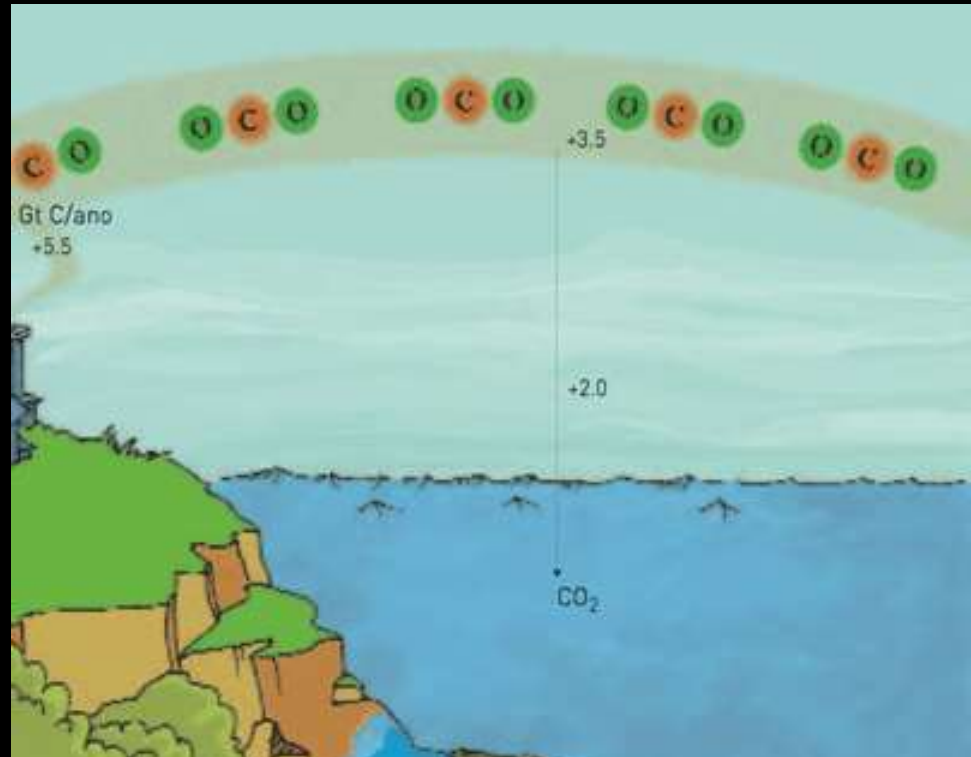
- The first ocean was probably made of water.

- fresh



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- Earth's atmosphere and surface cooled because ocean water also dissolved much of the _____ in the atmosphere.
 - carbon dioxide



The End

