Space Science Review

8th Grade Science
Standards-Based Review

Earth in the Solar System (Earth Sciences)

4. The structure and composition of the universe can be learned from studying stars and galaxies and their evolution. As a basis for understanding this concept:
   a. *Students know* galaxies are clusters of billions of stars and may have different shapes.
   b. *Students know* that the Sun is one of many stars in the Milky Way galaxy and that stars may differ in size, temperature, and color.
   c. *Students know* how to use astronomical units and light years as measures of distances between the Sun, stars, and Earth.
   d. *Students know* that stars are the source of light for all bright objects in outer space and that the Moon and planets shine by reflected sunlight, not by their own light.
   e. *Students know* the appearance, general composition, relative position and size, and motion of objects in the solar system, including planets, planetary satellites, comets, and asteroids.

Formation of the Solar System

The solar system formed out of a vast cloud of cold gas and dust called a **nebula**. Gravity and **pressure** were balanced, keeping the cloud unchanging until something upset the balance. Then the nebula began to collapse. Collapse of the solar nebula caused heating in the center. As materials crowded closer together, **planetesimals** began to form.

Formation of the Solar System

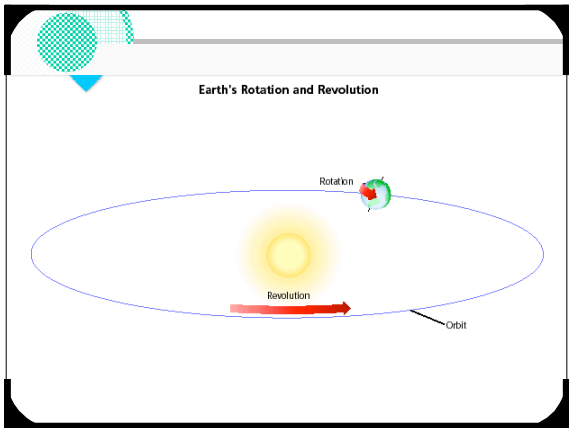
The central mass of the nebula became the **sun**. **Planets** formed from the surrounding disk of material. Because of their greater gravitational attraction, the largest planetesimals begin to sweep up more and more of the dust and gas of the solar nebula. Smaller planetesimals collide with the larger ones, and planets begin to grow. It took about **10 million** years for the solar system to form, and it is now **4.6 billion** years old.

Planetary Motion

A planet _____ on its own axis and _____ around the sun in a path called an _____.

Planetary Motion

A planet **rotates** on its own axis and **revolves** around the sun in a path called an **orbit**.



Earth Takes Shape

The Earth is divided into 3 main layers: _____, _____, _____. Materials with different densities separated because of high heat, pressure, and melting inside the Earth. Heavy elements sank to the center because of Earth's gravity. Earth's original atmosphere formed from the release of gases brought to Earth by meteorites and _____.

Earth Takes Shape

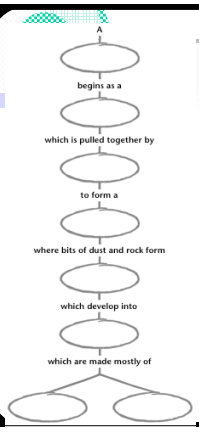
Earth's second atmosphere arose from impacts by comets and volcanic eruptions. The composition was largely water and _____. The presence of life dramatically changed Earth's atmosphere, adding free _____. Earth's oceans formed shortly after the Earth did, when it had cooled off enough for rain to fall. _____ were formed when lighter materials gathered on the surface and rose above sea level

Earth Takes Shape

The Earth is divided into 3 main layers: **crust mantle, core**. Materials with different densities separated because of high heat, pressure, and melting inside the Earth. Heavy elements sank to the center because of Earth's gravity. Earth's original atmosphere formed from the release of gases brought to Earth by meteorites and **comets**.

Earth Takes Shape

Earth's second atmosphere arose from impacts by comets and volcanic eruptions. The composition was largely water and **carbon dioxide**. The presence of life dramatically changed Earth's atmosphere, adding free **oxygen**. Earth's oceans formed shortly after the Earth did, when it had cooled off enough for rain to fall. **Continents** were formed when lighter materials gathered on the surface and rose above sea level



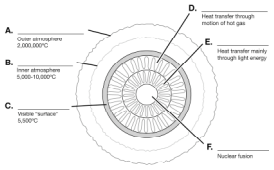
Chapter 17 Concept Map

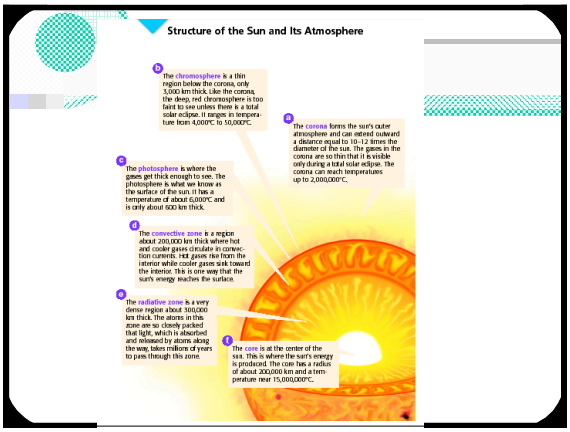
A **solar system** begins as a **nebula** which is pulled together by **gravity** to form a **solar nebula** where bits of dust and rock form **planetesimals** which develop into **planets** which are made mostly of **gas** and **rock**.

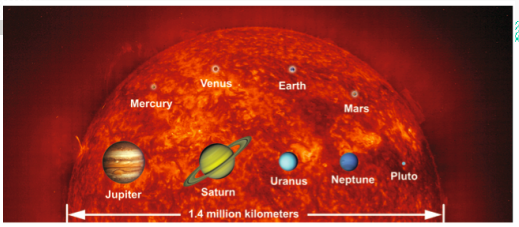
Anatomy of the Sun

A. Corona
B. Chromosphere
C. Photosphere
D. Convective Zone
E. Radiative Zone
F. Core

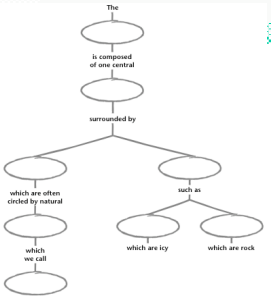
(remember… starting from the core - every other layer starts with a C)







Chapter 18 Concept Map



The **solar system** is composed of one central **star** surrounded b: (left) **planets** which are often circled by natural **satellites** which we call **moons** and (right) **small bodies** such as **comets** which are icy and **asteroids** which are rock.

Understanding Light Years

- An **Astronomical Unit (AU)** is 1.496×10^8 km (**the distance from Earth to the sun)**. This unit is usually what is used to measure distances within our solar system.
- To measure longer distances (like the distance between Earth and stars and other galaxies), the **light year (ly)** is used. A light year is the **distance that light travels through space in one year**, or 9.468×10^{12} km.

Understanding Light Years

Convert each number of light years to kilometers:

1. 6 light years =
   Answer: 5.69×10^{13} km
2. 11 light years =
   Answer: 1.04×10^{14} km

The Universe Beyond

1. **Parallax** is the apparent shift of nearby stars relative to more-distant stars as Earth orbits the sun.
2. A **globular** cluster is a group of older stars located in the halo of spiral galaxies.
3. A **black hole** is so small and massive that its gravity does not even le`t light escape.
4. A **white dwarf** is a small, hot start that is near the end of its life.

The Universe Beyond

5. A **spiral** galaxy has distinctive arms and a nuclear bulge.
6. A **neutron star** is a star of about two solar masses formed from a supernova.
7. An **elliptical** galaxy has a very bright center and contains almost no gas and dust.
8. A **nebula** is a giant cloud of gas and dust.
9. A large, cool star formed when a star runs out of hydrogen is a **red giant**.

The Universe Beyond

10. The **apparent** magnitude of a star is how bright it looks.
11. The explosive death of a star is a **supernova**
12. A large grouping of stars in space is called a **galaxy**.
13. A group of stars that form when a lot of gases and dust come together is known as an **open** cluster.
14. The diagonal pattern of stars on an H-R diagram is known as the **main sequence**.