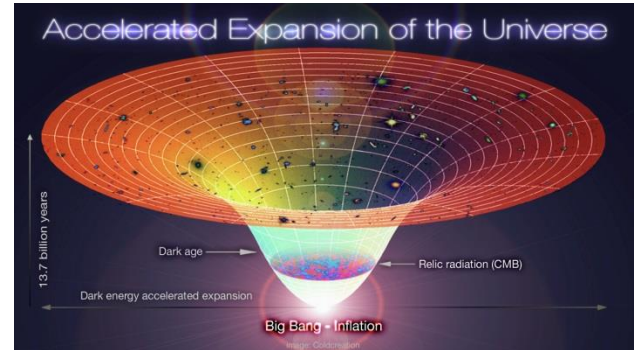


Introduction to Astronomy



Have you ever wondered what is out there in space besides Earth? As you see the stars and moon, many questions come up with the universe, possibility of living on another planet other than Earth, aliens, and much more.

It is thought the universe was formed because of a tremendous explosion. This theory is known as the Big Bang Theory. According to this theory, 10-15 billion years ago all contents of the universe gathered under extreme pressure, temperature, and density in a very tiny spot. Then, for some reason, it rapidly expanded outward. In the very early moments of the universe, some of the expanding energy turned into matter that eventually became the galaxies, such as the Milky Way, a spiral galaxy that contains our solar system. As the galaxies moved apart, they became older and eventually stopped forming stars. The support of the Big Bang Theory is found in the radiation coming from all directions. This is known as cosmic background radiation, thought to be left from the Big Bang.

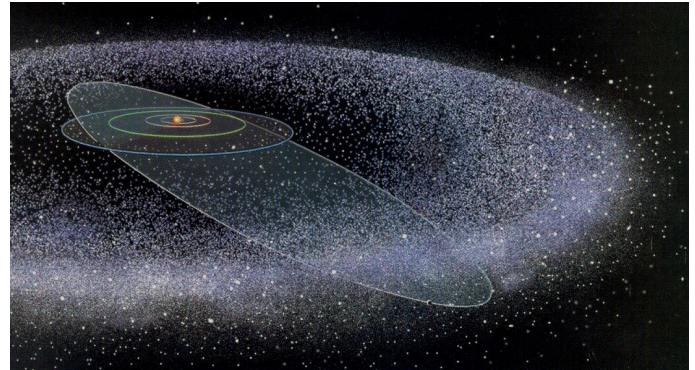


As gas and dust came together, they became very hot and dense. The gases, which are mostly hydrogen and helium, combined with tiny dust particles such as iron and carbon and formed a cloud called a nebula. In the central part of the nebula, the mass becomes very hot and dense, reaching temperatures of 10 million degrees Celsius. At this temperature, two hydrogen atoms combine or fuse to make helium. This process is called fusion. The result is a big ball of hot gasses – a star is born. As stars become older, they lose some of their material. Usually this is a gradual change, but sometimes it happens in a big explosion. Either way, when a star dies, much of its material returns to space where it combines with more gas and dust to form new stars.

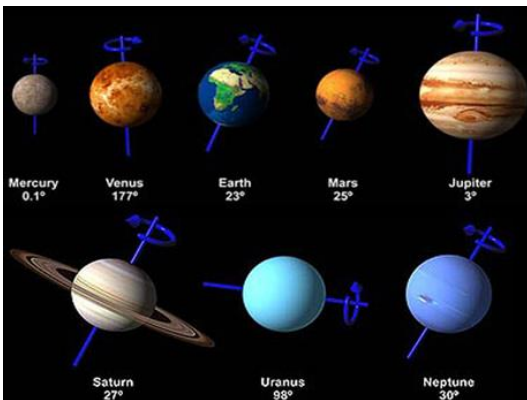
Our solar system consists of one star called the sun, eight planets, natural satellites, comets, and asteroids. The eight planets are classified into two groups: the inner planets and outer planets. The inner planets are also called terrestrial because they are small, dense, and rocky. The outer planets are called gas giants because they are large and do not have any known solid surfaces. Their atmospheres blend smoothly into the denser layers of their interiors. What separates the two groups of planets is the asteroid belt, which is formed between Mars and Jupiter.



Except for Mercury and Venus, planets have smaller objects that revolve around them. These objects are called satellites. Our satellite is called the moon. Some planets have more than one satellite, such as Jupiter and Saturn. Sometimes, a body from outside the solar system visits us. These are called comets. A comet is a small body of rock, ice and dust loosely packed together. There are two areas which scientists think that comets come from – the Oort Cloud (spherical region that surrounds our solar system) and the Kuiper Belt near the orbit of Neptune. Scientists believe that when a planet passes by or a star disturbs the cloud, comets are pulled into a smaller orbit and pulled toward the sun. When the comet nears the sun, solar radiation heats up the water in the ice causing the comet to give off gas and dust. This is what appears as the tail of the comet.



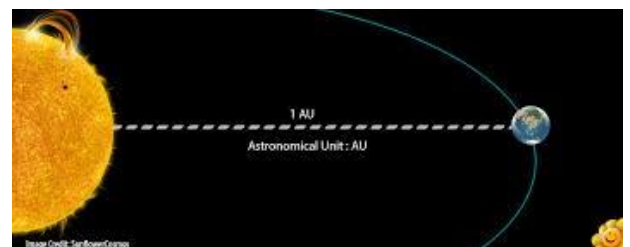
The sun and its eight planets are held together individually and collectively by gravity and pressure. Our solar system, which is about 4.6 billion years old, move in space according to strict physical laws. The different ways these bodies move have a variety of effects. Planets



move in two different ways. When a planet spins on its axis, it is called rotation. Only one-half of the planets' surfaces face the sun. As the planets rotate, different parts of the planets receive sunlight. The half facing the sun is called day while the other half facing away from the sun is called night. In addition to planets spinning on its axis, they also travel around the sun in a path called an orbit. This motion around the sun along the planet's orbit

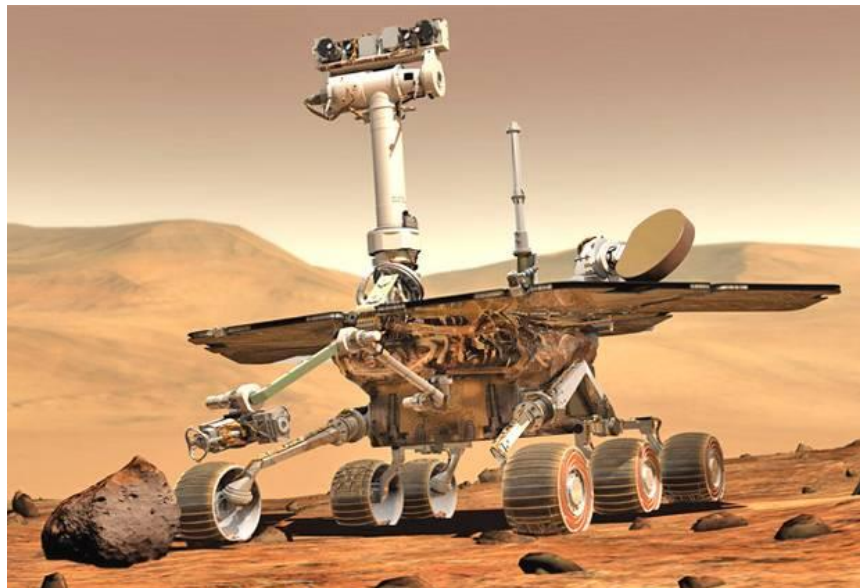
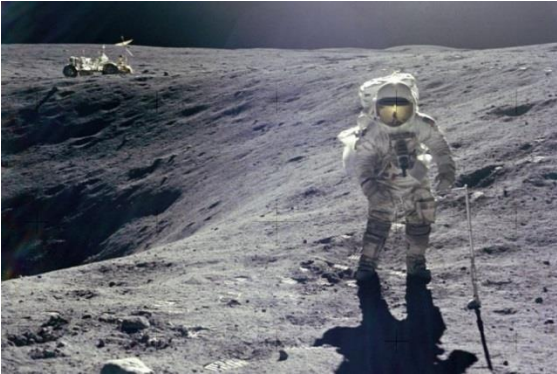
is called the revolution. The amount of time it takes for a single trip around the sun is called its period of revolution. One period of revolution gives us our year. Scientists also discovered that planets travel in an elongated circle called an ellipse.

Because planets and other objects in space have to travel long distances, it is impossible to track their motion and distances using the traditional measurements such as meters and kilometers. Therefore, it was necessary to create measurements for planetary distances such as astronomical units and light-years. An astronomical unit is the average distance between the earth and the sun. Its unit is AU. Another way to measure planetary distances is by the distance light travels in a given amount of time. Using this



method, distances can be given in light-years, light-hours, light-minutes and light-seconds. Light travels 300,000 kilometers per second in space. That would be equal to going around the earth 7.5 times in one second. Light from the sun reaches the earth in 8.3 minutes. Wow! That is Fast!

Our universe holds so much mystery. Scientists continue to search the universe for answers. Galileo, Copernicus, Brahe, Hershel, Hubble, Armstrong, and Aldrin have helped us in our understanding of the universe. Without them, our understanding may not be as it is today. Our knowledge of the universe continues to expand as people commit their lives to studying space by traveling to and landing on the moon (Apollo Missions), living on the International Space Station (ISS), putting the Hubble Space Telescope now its successor the James Webb Telescope into orbit and sending unmanned missions (rovers to Mars) to unknown parts of the universe



Modified from the Holt Physical Science Textbook

Introduction to Astronomy Guided Reading

(Answer all questions in your notebook p.11)

1. Read through "Introduction to Astronomy" and highlight any important information or anything that stands out to you.
2. Write one thing that you can remember from the article. Just choose one piece of information that you remember.
3. Now read paragraphs one and two.
4. If this theory is true, a long time ago all the stuff in the universe was squeezed together into a little spot. How long ago was this?
5. Actually, scientists think that all the stuff in the Big Bang was energy. Later it changed into matter. Some of the matter made galaxies, which have millions of stars. What is the name of the galaxy that we are in?
6. There are different types of galaxies. What type of galaxy is the Milky Way?
7. Read paragraph three. Describe the process of how we think a star is born (list steps).
8. Carefully read paragraph four.
9. Why are the outer planets called gas giants?
10. The asteroid belt contains millions of asteroids. Asteroids are rocks. Where is the asteroid belt?
11. Satellites go around planets. Artificial satellites are made by people. Natural satellites are called moons. How many planets have moons?
12. What are comets made of?
13. T or F Comets never leave the solar system.
14. Comets don't go around the sun in circles. They go in elliptical paths. An ellipse is like a flattened circle. Actually, planets don't have circular orbits either. They go in ellipses too. Comets' orbits are much longer and flatter than planets' orbits. Draw a small picture of a comet going around the sun.
15. Explain what forms the tail of a comet.

16. Carefully read paragraph five.

17. How old do they think the solar system is?

18. The planets spin. Each planet spins on its axis. What is this called?

19. Planets revolve around the sun. Is one period of revolution a day long, a week long, or a year long?

20. Carefully read paragraph six.

21. How far is an AU (astronomical unit)?

22. A light-year is how far light can go in a year. A light-minute is how far light can go in a _____.

23. Carefully read paragraph seven.

24. Pretend the US government and NASA offered you a chance to go on a mission to Mars. They will take care of your family financially for the next 40 years, but can't promise that you will return at the end of the four year mission. Would you go? Why or why not?

