**Ancient Astronomy and our Solar System with Planets**

**Description:**

The star is a representative star that is close enough to the earth to provide much information about the universe. An understanding of the sun is important to the study of earth science because the sun is the dominant member of the planetary system in which the earth is found. The sun is also the sources of almost all of the energy of the sun. Over the course of human history, people have developed many different models of the universe based on their observations of the sky. Thousands of years were needed to discover the place of earth in its solar system and the place of that solar system in the galaxies that make up the universe. However, new discoveries about the universe are now being made daily.

 **Textbook Chapters:**

22. Ancient Astronomy

 23. The Solar System

**Section 1: Early Astronomy**

**Section 2: The Earth-Moon-Sun System**

**Section 3: Earth’s Moon**

**Section 1: The Solar System**

**Section 2: The Terrestrial Planets**

**Section 3: The Outer Planets and Pluto**

**Section 4: Minor Members of the Solar System**

**State Standards:**

E.S. 1.1 Understand and discuss the nebular theory concerning the formation of solar systems. Include in the discussion the roles of planetesimals and protoplanets.

E.S. 1.2 Differentiate between the different types of stars found on the Hertsbrung-Russell Diagram. Compare and contrast the evolution of stars of different masses. Understand and discuss the basics of the fusion processes that are the source of energy of stars.

E.S. 1.3 Compare and contrast the differences in size, temperature, and age between our sun and other stars.

E.S. 1.4 Describe Hubble’s law. Identify and understand that the “Big Bang” theory is the most widely accepted theory explaining the formation of the universe.

E.S. 1.5 Understand and explain the relationship between planetary systems, stars, multiple-star systems, star clusters, galaxies, and galactic groups in the universe.

E.S. 1.6 Discuss how manned and unmanned space vehicles can be used to increase our knowledge and understanding of the universe.

E.S. 1.7 Describe the characteristics and motions of the various kinds of objects in our solar system, including planets, satellites, comets, and asteroids. Explain that Kepler’s laws determine the orbits of the planets.

E.S. 1.8 Discuss the role of sophisticated technology, such as telescopes, computers, space probes, and particle accelerators, in making computer simulations and mathematical models in order to form a scientific account of the universe.

E.S. 1.9 Recognize and explain that the concept of conservation of energy is at the heat of advances in fields as diverse as the study of nuclear particles and the study of the origin of the universe.

E.S.2.1 Understand and explain that Claudius Ptolemy, an astronomer living in the second century, devised a powerful mathematical model of the universe based on constant motion in perfect circles and circles on circles. Further understand that with the model, he was able to predict the motions of the sun, moon, and stars, and even of the irregular “wandering stars” now called planets.

E.S. 2.2 Understand that and describe how in the sixteenth century the Polish astronomer Nicholas Copernicus suggested that all those same motions outlined by Ptolemy could be explained by imagining that Earth was turning on its axis once a day and orbiting around the sun once a year. Note that this explanation was rejected by nearly everyone because it violated common sense and required that the universe to be unbelievably large. Also understand that Copernicus’s idea of sun-centered flew in the face of belief, universally held at the time, that Earth was at the center of the universe.

E.S. 2.3 Understand that and describe how Johannes Kepler, a German astronomer who lived at about the same time as Galileo, used the unprecedented precise observational data of the Danish astronomer Tycho Brahe. Know that Kepler shoed mathematically that Copernicus’s idea of a sun-centered system worked better than any other system if uniform circular motion was replaced with variable speed, but predictable, motion along off-center ellipses.

E.S. 2.4 Explain that by using the newly invented telescope to study the sky, Galileo made may discoveries that supported the ideas of Copernicus. Recognize that it was Galileo who found the moons of Jupiter, sunspots, craters and mountains on the moon, the phases of Venus, and many more stars than were visible to the unaided eye.

**Objectives:**

**22.1 Early Astronomy, pp. 614–621**

**22.1 Describe** the contributions of ancient Greeks to astronomy.

**22.2 Compare and contrast** the geocentric and heliocentric models of the solar system.

**22.3 Explain** the contributions to astronomy of Copernicus, Brahe, Kepler, Galileo, and Newton.

**22.2 The Earth-Moon-Sun System, pp. 622–629**

**22.4 Describe** the movements of Earth known as rotation, revolution, and precession.

**22.5 Explain** how the moon goes through phases.

**22.6 Explain** how eclipses occur.

**22.3 Earth’s Moon, pp. 630–634** **L2**

**22.7 Describe** how the physical features of the lunar surface were created.

**22.8 Explain** the history of the moon.

**23.1 The Solar System pp. 644–648**

**23.1 List** the major differences between the terrestrial and Jovian planets.

**23.2 Explain** how the solar system formed.

**23.2 The Terrestrial Planets pp. 649–653**

**23.3 Describe** the distinguishing characteristics of each terrestrial planet.

**23.3 The Outer Planets (and Pluto) pp. 654–659**

**23.4 Describe** the distinguishing characteristics of each Jovian planet.

**23.5 Explain** why Pluto is not considered a planet.

**23.4 Minor Members of the Solar System**

**23.6 Identify** the location within our solar system where most asteroids are found.

**23.7 Describe** the structure of a comet.

**23.8 Explain** the possible origins for a meteoroid.

**Learning Activities:**

1. Discussion/Lecture on Ancient Astronomy, Stars and Galaxies and the Sun and Moon, and The Solar System

2. Discussion on Black Holes
3. Into a Black Hole-Web Quest

4. Chapter 22 and 23 Review

5. Environmental Week with Earth Day Activities

6. Stars and Galaxies along with Planets Project and Presentations

7. Apollo 13 Visual and Discussion