



Name: \_\_\_\_\_ #: \_\_\_\_\_

Date: \_\_\_\_\_

Section: \_\_\_\_\_ HR: \_\_\_\_\_

## Chapter 2: Our Solar System At A Glance

From our small world we have gazed upon the cosmic ocean for thousands of years. Ancient astronomers observed points of light that appeared to move among the stars. They called these objects planets, meaning wanderers, and named them after Roman deities--Jupiter, king of the *gods*; Mars, the god of war; Mercury, messenger of the gods; Venus, the god of love and beauty, and Saturn, father of Jupiter and god of agriculture. The stargazers also observed comets with sparkling tails and meteors or shooting stars apparently falling from the sky.

Since the invention of the telescope, two more planets have been discovered in our solar system: Uranus (1781) and Neptune (1846). In addition, there are thousands of small bodies such as asteroids and comets. Most of the asteroids orbit in a region between the orbits of Mars and Jupiter, while the home of comets lies far beyond the orbit of Pluto (dwarf planet), in the *Oort Cloud*.

The four planets closest to the Sun--Mercury, Venus, Earth, and Mars--are called the terrestrial planets because they have solid rocky surfaces. The four large planets beyond the orbit of Mars-- Jupiter, Saturn, Uranus, and Neptune--are called gas giants.

Nearly every planet--and some of the moons--has an atmosphere. Earth's atmosphere is primarily nitrogen and oxygen. Venus has a thick atmosphere of carbon dioxide, with traces of poisonous gases such as sulfur dioxide. Mars' carbon dioxide atmosphere is extremely thin. Jupiter, Saturn, Uranus, and Neptune are primarily hydrogen and helium.

There are 240 natural satellites (also called moons), 163 of which revolve around the various planets in our solar system, ranging from bodies larger than our own Moon to small pieces of debris. Many of these were discovered by planetary spacecraft. Some of these have atmospheres (Saturn's Titan); some even have magnetic fields (Jupiter's Ganymede). Jupiter's moon Io is the most volcanically active body in the solar system. An ocean may lie beneath the frozen crust of Jupiter's moon Europa, while images of Jupiter's moon Ganymede show historical motion of icy crustal plates. Some planetary moons may actually be asteroids that were captured by a planet's gravity. The captured asteroids presently counted as moons may include Phobos and Deimos, the outer 8 satellites of Jupiter, Saturn's Phoebe, Uranus' new satellites, and possibly Neptune's Nereid.

From 1610 to 1977, Saturn was thought to be the only planet with rings. We now know that Jupiter, Uranus, and Neptune also have ring systems, although Saturn's is by far the largest. Particles in these ring systems range in size from dust to boulders to house sized, and may be rocky and/or icy.

Most of the planets also have magnetic fields which extend into space and form a "magnetosphere" around each planet. These magnetospheres rotate with the planet, sweeping charged particles with them. The Sun has a magnetic field, the heliosphere, which envelops our entire solar system.

Ancient astronomers believed that the Earth was the center of the Universe, and that the Sun and all the other stars revolved around the Earth. Copernicus proved that Earth and the other planets in our solar system orbit our Sun. Little by little, we are charting the Universe, and an obvious question arises: are there other planets around other stars? Are there other planets where life might exist? Only recently have astronomers had the tools to indirectly detect large planets around other stars in nearby galaxies. Direct detection and characterization of such planets awaits development of yet more powerful observing tools and techniques.