

## Chapter 1 Review Notes - GLG 105

- The solar system contains one star (the Sun or “Sol”), nine *planets* (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, and Pluto, in order of increasing average distance from the Sun), and countless thousands of planetary bodies (which include the 9 planets, their moons (natural satellites), asteroids and comets)
- The Sun is composed almost entirely of hydrogen and helium, and is powered by nuclear fusion (of hydrogen into helium) at its core
- All planets (and smaller bodies that aren’t moons) rotate/spin on their rotational axes and revolve around the Sun in elliptical orbits, with the orbits of all the planets but Mercury and Pluto being nearly circular.
- The amount of time it takes for a planetary body to circle the sun once is called its *orbital period* (one *year* is the orbital period for the Earth)
- The amount of time it takes to spin around once on its axis is called its *rotation period* (one *day* is the rotation period for the Earth)
- The four innermost planets (Mercury, Venus, Earth, Mars) are solid/rocky and are referred to as the “terrestrial” (Earth-like) planets
- The next four planets (Jupiter, Saturn, Uranus, Neptune) are composed primarily of gases, and are referred to as the “gas giants”
- Pluto is actually just the largest member (so far discovered) of a third group of icy bodies that inhabit the outer reaches of the solar system, and which include the comets of the Kuiper Belt (observed) and Oort Cloud (theoretical)
- The moons in the solar system are primarily rocky and/or icy bodies, ranging in size from a few kilometers to several thousand kilometers in diameter (two are slightly larger than Mercury!), that orbit a planet
- Small (typically 10s of km in diameter), rocky, typically non-spherical bodies that orbit the Sun independent of any planet are known as *asteroids*. The vast majority of asteroids orbit around the Sun in a region between the orbits of Mars and Jupiter (much closer to the smaller Mars) known as the *asteroid belt*

- Small, icy bodies dominate the outer solar system, beyond the orbit of Neptune, in a region known as the *Kuiper Belt*. Pluto is the largest *Kuiper Belt Object (KBO)* found so far

- Impact cratering is a process that involves the high-velocity impact of asteroids or comets into solid planetary surfaces, leaving more or less circular depressions surrounded by a blanket of debris (ejecta) that was excavated from the crater site
- Planetary *resurfacing* can erase impact craters by processes involving both burial and wearing away. These include volcanism and gradation (erosion)
- The solar system is believed to have formed from a contracting cloud of gas and dust (a *nebula*) that flattened into a disc. This *protoplanetary disc* stage was theoretical until the 1990s, when high-resolution images from the Hubble Space Telescope began to reveal such discs in nebulae throughout our galaxy
- Gravitational forces led to clumping of dust and gas into larger and larger planetesimals, which further collected gas and dust to produce planetary embryos and finally planets. Many of the asteroids and meteorites, and probably all of the Kuiper Belt Objects, are remnants of this early *accretion* or growth stage that never quite clumped into planet-sized bodies
- The largest planetary bodies had sufficient gravity to capture gases (primarily hydrogen and helium) from the solar nebula, and became the gas giants. Smaller planetary bodies did not capture these gases and now form the terrestrial planets. The denser gases in the atmospheres of Earth, Venus, and Mars (primarily N<sub>2</sub>, CO<sub>2</sub>, and CO<sub>2</sub>, respectively) were released by later volcanism and impact cratering events
- The vast majority of all bodies in the solar system have orbits that lie in a plane known as the *ecliptic plane*, which represents the orientation of the original protoplanetary disc