

Astr178 - Planets and Planetary Systems

Exam study notes.

- 1.0 Solar System
- 1.1 Earth
- 1.2 The Moon.
- 2.0 Mercury
- 3.0 Venus
- 4. Mars
- 5.0 Asteroid belt & meteors.
- 6.0 Jupiter
- 7.0 Saturn
- 8.0 Uranus
- 9.0 Neptune
- 10.0 Pluto & Others
- 11. Definitions

1.0 Solar System

The Radiometric dating of meteorite material is the best method for determining the age of the Solar System.

Astronomical unit: AU - 1.496×10^8 km. This is how distance is measured within the Solar system.

Kepler's Law - Planetary Motion:

- 1. Law of Ellipses. Things do not orbit in perfect circles. The planets are orbiting the Sun in an elliptic path.
- 2. Law of equal areas. The speed at which any given planet will move while orbiting the sun. The speed is constantly changing. A planet moves fastest when it is closest to the Sun and slower when it is further away.
- 3. The law of harmonies. Compares the orbital period and radius of orbit of a planet to those of other planets.

Newton's 3 laws

- 1. A body stays at rest or continues in a state of motion till an outside force changes that state. Conservation of momentum.
- 2. The rate of change in velocity (acceleration) if a body is proportional to the force action on it. For the same applied force more massive objects accelerate slower than less massive ones. ($F=ma$)
- 3. To every action there is an equal and opposite reaction.

Newton's law of gravity states that a particle attracts every other particle in the universe using a force that is directly proportional to the product of their masses and inversely proportional to the square of the distance between them.

Composition of the planets:

Terrestrial: Small, rocky and metallic with a high metal content.

(Mercury, Venus, Earth, Mars)

Gas giants: Largest, mostly made up of Helium and Hydrogen.

(Jupiter and Saturn).

Ice Giants: Medium in size and made up of ice.

(Uranus, Neptune)

- Rocky planets have high density, gas planets do not.
- Tides raised by moons.
- Tides reduce elongation
- Orbit becomes larger. Drives tugs and pulls inside the planet, causing friction and slowing down the rotation period of the planet.

Planetary Contraction/Cooling: All planets start off cooling gradually, with solar radiation being unimportant, & finish with internal energy being unimportant.