

Chapter 4 Review

Note in addition to this review you should also read the chapter thoroughly.

Babylonians – Knew the length of the year within about 4 minutes

Divided the year into 12 months, each of 30 days. Used a Number system based on 60 which allowed them to describe angles with 60 arc-minutes in 1 degree and 60 arc-seconds in 1 arc-min.

Could predict solar and lunar positions as well as eclipses

Pythagoras – Foundations of Trig and Geometry

Said Earth is round and all heavenly objects move in perfect circles

Anaxagoras – moon shines by reflected light and thus could explain eclipses

Parallax- The apparent motion of an object when viewed from two places.

The lack of observed parallax was the reasoning behind the geocentric universe

Retrograde Motion – The backwards motion especially of Mars that was hard to describe with geocentric universe

Aristotle – DA' MAN! Plato's student His writings on philosophy, history, politics, poetry, ethics, drama and science were assumed and often were correct.

Said the universe consisted of two parts, a perfect heaven and corrupt Earth

Believed in Geocentric universe

Physics of earth, water, air, and fire that seek a natural order

Eratosthenes - Calculated the Earth's radius from a shadow produced on the summer solstice in two places on Earth.

Hipparchus – Star catalogues

Said the sun and moon followed circular orbits about Earth, but Earth was not at the center.

Ptolemy- Last classical Astronomer. Believed in geocentric universe. Explained retrograde motion using epicycles.

Copernicus – First modern astronomer. Believed in heliocentric (sun centered) universe with uniform circular orbits for the planets.

Tycho Brahe – Recorded the most detailed observations of the positions of planets before the invention of the telescope. Observed a supernova in 1572 and deduced it must be far away. He thought the planets orbited the sun and the sun and moon orbited the Earth.

Johannes Kepler – Worked for Brahe. After Brahe’s death was able to derive an accurate model of the solar system from Brahe’s observations.

KEPLERS THREE LAWS

1. Planets orbit the sun in elliptical paths with the sun at one foci
2. Planets sweep out equal area in equal amounts of time. (Note this means they must move faster when near the sun and slower when further away.)
3. $P^2 = ka^3$ where P is the orbital period k is a constant and “a” is the semi major axis of the orbit. Note is P is in years and “a” is in AU then $k = 1$

Galileo Galilei – Experimenter. Noted that object fall at the same speed regardless of mass if air resistance can be ignored. Also was the first to say objects move in a straight line until something causes them to change course. Made a telescope that he observed moons of Jupiter with. Noted the mountains and Valleys of the moon. Noted that there were countless stars in the milky way. Supported Copernican model of solar system. Was tried during the Inquisition. You need to read about the trial in the text. Observed the phases of Venus and could explain it based on geocentric universe.

Isaac Newton – Classical physics, developed calculus, described the Universal law of gravitation.

3 Laws of motion.

1. Objects move in a straight line until acted upon by an outside force
 2. $F=MA$
 3. For every force there is an equal an opposite force acting on a separate object.
- Universal law of Gravitation $F=GmM/r^2$

Note if you double either of the masses then the Force doubles but if you double the separation distance (r) then the force decreases by a factor of 4.

Escape velocity – Speed required to escape the gravitational pull of an object.