

Useful Things to Study (#1)

Topics appearing on the test may include, but are not limited to, these:

Kepler's 3 law of planetary motion

Newton's 3 laws of basic mechanics

Kirchhoff's laws of spectra (what produces a continuous spectrum, an emission line spectrum, or an absorption spectrum, and what these spectra look like)

the scientific method (testability, falsifiability)

Occam's razor

What makes for a good hypothesis?

What is a scientific *paradigm*? Examples...

powers of 10 notation

What do we mean by the term "star"? A planet? A comet? An asteroid? A galaxy?

diameter of the Earth, circumference of the Earth

mean Earth-Sun distance (length of the "Astronomical Unit")

What is a light-year (conceptually, numerically)?

right ascension and declination

elevation angle and azimuth

the ecliptic

the zodiac

the vernal equinox

the celestial meridian, the zenith, the nadir

North Celestial Pole

latitude, longitude (on Earth)

cause of the seasons

precession of the equinoxes

Why are these people famous? Pythagorus, Aristotle, Eratosthenes, Aristarchus, Hipparchus, Ptolemy, Copernicus, Tycho Brahe, Kepler, Galileo, Newton

Gravitational force decreases with the square of the distance. Light intensity decreases with the square of the distance. Tidal force decreases proportional to the *cube* of the distance.

Geometry of the Earth-Moon-Sun, and how that gives the Moon's phase.

What causes a lunar eclipse? What causes a solar eclipse? What is the Moon's phase for each?

Orbits or trajectories are circles, ellipses, parabolas, or hyperbolas. Difference between bound and unbound orbits. What is the significance of the semi-major axis of an elliptical orbit?

retrograde motion, direct motion

epicycles and deferents

difference between scalars and vectors (give examples)

mass, speed, velocity, acceleration, momentum, force

kinetic energy, gravitational potential energy, angular momentum

conservation of total orbital energy

conservation of angular momentum

escape velocity

nuclear fusion vs. chemical burning

different kinds of light (gamma rays, X-rays, etc.)

structure of atoms (nuclei made of protons and neutrons, electrons far outside nucleus)

significance of energy levels of atoms

absorption and emission of photons by atoms

ionization of an atom

transmission of light (by glass, air, or water)

Doppler shifts of spectral lines

reflection and refraction

reflecting telescopes vs. refractors

magnification

resolution of a telescope

light gathering power

limit of resolution set by turbulence in the atmosphere ("seeing")

adaptive optics

How can we look back in time with a telescope?