

ASTRONOMY 110G Review Questions for Examination #1

Explain why the Earth has seasons. What aspects of the Earth's motions produce this result? What about day and night?

Why do we see different constellations at different times of night? At different times of year?

Summarize the basic differences between the Ptolemaic, Copernican, and Keplerian descriptions of planetary, solar, and lunar motions.

Explain why our Moon exhibits phases. Describe them, and explain why they occur in the observed sequence. What are the synodic and sidereal months and why do they differ in length?

Describe the circumstances under which lunar and solar eclipses occur. Why don't we see one of each every month, and why are solar eclipses so much rarer events than lunar eclipses?

What would the Earth look like, as seen from the Moon, at a given lunar phase? What would lunar and solar eclipses look like as seen from the Moon?

Describe the annual motion of the Sun among the fixed stars of the celestial sphere. How does this motion affect the daily apparent motion of the Sun across the sky?

What is a "stellar parallax" and why does it arise. Why was it so important to the history of astronomy and why did the "problem" of the parallax remain so long a problem?

What were Aristotle's arguments for a spherical Earth? What were his reasons for believing that the Earth did not move? What was wrong with the latter arguments?

Explain how Aristarchus used simple geometrical arguments and measurements to determine relative sizes and distances for the Sun, Moon, and Earth. What observations did he make? What assumptions?

Explain how Eratosthenes determined the size of the Earth. What were the observations and assumptions he used to do this?

Ptolemy determined the Moon's distance by triangulation. Tycho later used the same technique to prove that comets and a (super)nova were extraterrestrial objects. Explain how this was done.

What are the sidereal and synodic periods of a planet? Why are they different? How are these related to each other? What about the sidereal and synodic periods of the Moon?

To a naked-eye observer, what distinguishes the planets from the stars? What about with a telescope?

Describe the motions of the Earth, Sun, Moon, and planets according to the Ptolemaic System. What were the principal difficulties with this picture? What about the Copernican system?

Kepler's first two laws are based upon his determination of the size and shape of the Martian orbit and Mars' motion along it. How did he make these determinations? What are Kepler's Laws anyway? (Why did he use observations of Mars rather than, say, Mercury or Saturn?)

Define or explain the following terms: Zenith; Nadir; Horizon; Meridian; Celestial Equator; Celestial Pole; Terrestrial Latitude; Terrestrial longitude. What's a "circumpolar" star?

Define or explain the following terms: Direct and Retrograde; Ecliptic; Equinox; Solstice; Eclipse; Zodiac; Sidereal Period; Synodic Period.

What, if anything, does the "ecliptic" have to do with eclipses?

Ptolemy's system was geocentric, Copernicus' was heliocentric, and Kepler's (strictly speaking) was neither. Explain this statement (particularly the last part).

Which observation, invention, experiment, or discovery of Galileo proved that the Ptolemaic System had to be incorrect. Prior to this, what was the strongest observational indication favoring the Copernican view? The Ptolemaic view?

Where on Earth are all stars visible at one time or another? Where are half of the stars never visible at any time of year? Why? Where do the stars go in the daytime?

The annual motion of the Sun upon the celestial sphere is not uniform. It moves faster at sometimes of year than others. How did Hipparchus explain this? Copernicus? Kepler?

What are the solar and sidereal days and how are they defined? Why do they differ in length?

What is the distinction between a planet's orbital period and its synodic period?

Upon what does the gravitational force between two objects depend?

Newton's version of Kepler's Third Law differs slightly from Kepler's version. What is this difference and why doesn't it have much effect when planetary motions are concerned?

What causes the tides? What relatively simple observations support your explanation?

Explain why planets are observed to exhibit periodic brightness variations and periodic episodes of retrograde motion. How are these periods related? How does a planet's brightness and apparent state of motion depend upon its location upon the celestial sphere? (Hint: think about the Moon.)

Why is the sky blue? Why does the setting (or rising) Sun (or Moon) look reddish?

Define or explain: Reflection; Refraction; Dispersion; Diffraction; Interference; Scattering; Absorption. Give an example of each phenomenon from everyday experience.

Describe the different types of spectra characterizing solids, liquids, and gases. Consider both the absorption and emission of such materials. How do these spectra depend upon size, shape, composition, temperature, etc.

Why do gases of different composition exhibit different patterns of spectral lines?

Which phenomena exhibited by light indicate a wavelike nature? A particle-like nature? In what very important respects does the observed behavior of light in motion differ from that of other particles or waves?

The inverse-square law for light is very important because it sometimes provides a means for determining intrinsic properties of an object from its observed brightness. Explain.

What is the Doppler Effect? What can it tell us about the motions of stars and other objects?

Electromagnetic radiation, including "light", can be described in terms of waves with some wavelength and frequency or in terms of particles ("photons") with some energy moving with some sort of speed. Visible light is often described in terms of color. How are the underlined items related to one another?

How would you go about demonstrating that light really does normally travel in straight lines? When does it fail to do so?