Physics 109: Homework Questions (Handout #1)

Homework #1 Due 10 Sept Deadline 14 Sept

1.1 Write the following numbers in exponential notation (powers of ten notation): (a) one billion, (b) thirty thousandths, (c) the number of seconds in a year, (d) one hundred forty nine million.

1.2 Using Figure 1.14 in Fix (p. 8), find the altitude and azimuth of a star located halfway between the zenith and the horizon in the southwest. What is the altitude and azimuth of a star on the zenith?

1.3 Suppose an observer in the southern hemisphere determines that the diurnal motion of a star keeps it above the horizon for 16 hours. Is the star in the northern or southern hemisphere of the celestial sphere? Does the star rise in the southeast or the northeast? How much time elapses between the time the star rises and the time it crosses the meridian?

1.4 Suppose the plane of the Moon's orbit was not close to the plane of the ecliptic (as it actually is) but was oriented 90 degrees to the ecliptic. Describe how the Moon's appearance and motion through the sky would vary over the course of a month. Contrast this with the Moon's actual appearance and motion.

1.5 How would the properties of the Earth's motion need to be changed in order to make the seasonal temperature variations (a) more extreme and (b) less extreme? Explain why.

Homework #2 Due 17 Sept Deadline 21 Sept

2.1 Explain the motion of the Moon, both diurnal and annual, in terms of the rotation of spheres as Eudoxus would.

2.2 How critical can we be of those ancients who believed the Earth to be the center of the Universe? Consider the following questions while writing your answer: (a) Did they have any basis for not putting the Earth at the center? (b) Did either possibility fit the observations? (c) Did any Greeks *prove* that any celestial bodies do or do not revolve around the Earth?

2.3 Why did the ancient Greek astronomers reject Aristarchus' heliocentric model of the solar system? Which of these reasons are nonsensical and which are sound, based on modern ideas?

2.4 In Ptolemy's model of the solar system which of these planetary configurations: inferior conjunction, superior conjunction, opposition, and quadrature, is it possible for Mars to appear in? Same question for the planet Venus. List all possible configurations.

2.5 Nearly all known civilizations (Mesopotamian, Egyptian, Greek, Chinese, and Mesoamerican) made detailed astronomical observations of the motions of the Sun, Moon, and planets. What is it about the ancient Greeks and their astronomical studies that explains why we focus on their studies the most?