Unit 8: Astronomy

Text:
Sidereus Nuncius. *Commentariolus*. http://www.themcclungs.net/astronomy

Vocabulary:
Celestial Sphere, celestial equator, ecliptic, zodiac, retrograde motion, deferent, epicycle, equant, "Music of the Spheres," precession, equinox (vernal & autumnal), solstice (winter & summer), ellipse, eccentricity, perihelion, aphelion, semi-major axis, astronomical unit, sidereal, synodic, parallax,

Math:
definitions: $e = \frac{c}{R}$ $\frac{T^2}{R^3} = k$

derived formulas: $T = \frac{S}{S \pm 1}$

skills: right triangle trigonometry, definition of ellipse

Key Objectives:
Calculations
- be able to give the position of the sun or North Star from any position on the earth on either equinox or solstice.
- be able to use the idea of parallax and triangulation to find the position of an object.
- be able to calculate synodic periods from sidereal and vice-versa.
- do calculations involving the following orbital quantities: aphelion, perihelion, eccentricity, semi-major axis and period of orbit.
- in general, be able to do calculations similar to the worksheets/homework done in class
- given appropriate data, calculate the size of a planet.
- [given a series of observational data (of the "sun" and other planets) from a fictional planet, be able to calculate periods and graph orbits.]

Concepts
- be able to explain the phases of the moon and eclipses.
- explain why Aristotle (and other astronomers through the 17th century) rejected a heliocentric theory of the solar system; distinguish between "scientific" reasons and "philosophical" reasons
- in general, be able to use and explain the vocabulary listed above.
- explain and use Kepler's 3 Laws.
- describe the motions in the sky that models of the solar system try and explain.
- explain what observations can "prove" or disprove the various models of the solar system?

History
- explain the historical significance/major contributions of the people discussed in class:
  - Major Greeks: Aristotle, Aristarchus, Eratosthenes, Hipparchus, Ptolemy,
  - Scientific Revolution: Copernicus, Brahe, Kepler, Galileo
  - Minor Greeks: Thales, Pythagoras, Anaxagoras, Strato, Eudoxus
  - Note: you do not need to remember exact dates or exact places - but be able to put the above in chronological order. Spelling will not count, as long as it is close.
- discuss the significance of the assigned readings, including the details of what the authors were saying, the social context and reactions to the works.
- compare and contrast the three main models of the solar system prior to Kepler discussed in class (Ptolomeic, Tychonic and Copernican.)