Astronomy 161 – Introduction to Solar System Astronomy
Winter Quarter 2010 – Prof. Martini

Quiz 3 Study Guide

Please Note: While this guide lists the material I consider to be the most important, some of the other material I cover in class will still be on the Quiz.

General Advice:

Please read through the "Course Objectives" on the syllabus. These objectives are the guidelines I follow to determine the material we cover in this course, as well as the material I will use to evaluate you.

Quiz 3 will cover all of the material I have covered in class from the previous quiz. This corresponds to Lecture 18 (Resonances) through Lecture 26 (Earth's Interior).

As a general rule, I strongly recommend that you are familiar with all of the concepts I list on the "Key Ideas" slide and the "Warm Up Questions" I show at the beginning of class. The "Key Ideas" slides are also part of the lecture outlines available on the class website. I strongly encourage you to become familiar with each of these topics and understand why each is important.

Resonances

Three-Body Problem and Lagrange Points

Prediction of Neptune as a further triumph of Newton's Law of Gravity

The Gravitational Slingshot

Solar System Orbital Resonances

Tides

Cause of tides and their effects: 1) Locking the Moon's rotation; 2) Slowing the Earth's rotation; 3) Lunar Recession

Light

The speed of light is 300,000 km/s in vacuum

Light is electromagnetic radiation and can be thought of as both waves and particles (photons)

Evidence for the wave and particle nature of light

Change in energy across the electromagnetic spectrum

Brightness decreases as the inverse square of the distance

Matter

Components of the atom (protons, neutrons, electrons)

Nature of chemical elements and which are most abundant
Four forces of nature
Radioactivity and half-life

Light and Matter

The meaning of temperature
Kirchoff's Three Laws of Spectroscopy and how continuous, emission-line, and absorption-line spectra are produced
Properties of blackbodies expressed by Wien's Law and the Stefan-Boltzmann Law

Spectroscopy

Absorption and emission of photons
Spectral lines as fingerprints of the elements

Telescopes

Basic properties of refracting and reflecting telescopes
Observatory sites

Age of the Earth

Radiometric age dating
Estimate of the age of the Earth (4.6 billion years)

Earth's Interior

Differentiation of the Earth's interior (inner core, outer core, mantle, crust) and how it is known
Nature of and evidence for continental drift, plate tectonics
Origin of the Earth's magnetic field

Some thought questions

1. How has the Earth-Moon system evolved? How has this affected tides?
2. What is an argument for the particle nature of light? the wave nature of light?
3. What would the consequences be if the Sun were twice as hot? Twice as far away?
4. Why is gravity more important than the electromagnetic force on large scales?
5. Why do emission lines and absorption lines occur at the same wavelengths for an atom?
6. Why are telescopes commonly located at high elevations in the desert?
7. Why does radiometric dating only provide a lower limit to the age of the Earth?
8. How do we know the interior structure of the Earth?