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

Quiz 4 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 4 will cover all of the material I have covered in class from the previous quiz. This corresponds to Lecture 27 (Earth's Atmosphere) through Lecture 34 (Asteroids and Meteorites).

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.

Earth's Atmosphere

Change of the atmosphere's composition over time and the reason for this change

Importance of the atmosphere for the temperature of the Earth (Greenhouse Effect)

Structure and origin of the Earth's atmosphere

The Moon

Surface of the Moon and age estimates

Interior of the Moon and comparisons with Earth

Theory for the formation of the Moon and observational evidence that supports this theory

Overview of the Solar System

Main constituents of the Solar System:

Sun, eight planets, asteroids, comets, moons, Trans-Neptunian Objects

Basic properties of the planets

Clues to the Solar System's formation from orbits, rotation, and chemical composition

How do we measure these properties?

Origin of the Solar System

Role of temperature, and specifically the 'frost line,' in the present masses of the planets

Growth of planets from small grains to planetesimals to planets
Differences in the formation and evolution of the terrestrial and Jovian planets
Interplay between surface gravity and temperature in establishing atmospheres

Sunny Mercury
Innermost planet, hot, locked into 3:2 tidal resonance
Heavily cratered, old surface with virtually no atmosphere and a large iron core

Veiled Venus
Twin to Earth in size, but substantially hotter due to runaway greenhouse effect
Retrograde rotation, evidence for relatively young surface

Red Mars
Small planet with two captured moons
Thin and dry CO_2 atmosphere, mostly lost due to low mass
Search and evidence for liquid water, prospects for life

Asteroids and Meteorites
Properties of the asteroid belt
Composition of asteroids and meteorites, distinction between meteors, meteoroids, and meteorites
Impacts on the Earth's surface

Some thought questions

1. How might the Earth's atmosphere be different if there was no life? no volcanos?
2. Why might the Earth and Moon have different cratering histories? Why are there observed differences?
3. Why do we think the Solar System formed from a rotating, gaseous disk around the proto-Sun? What are three properties of the Solar System that support this hypothesis?
4. Why are the planets closer to the Sun small and rocky, while those farther away are massive, gaseous giants? How do we know these differences exist?
5. Put the four terrestrial planets in order of the size of their day-night temperature difference and explain these differences.
6. What are at least three pieces of evidence for water (solid, liquid, or gaseous) on Mars?
7. Compare and contrast the surfaces of the terrestrial planets and what they tell us about each.