

ERTH01: Review Sheet
Final Exam – June 16, 2006
11:30 am -2:30 pm

The final exam will be comprehensive and multiple-choice. The exam will cover material from the entire quarter but emphasis will be given to the more recent classes. This review sheet is a guideline only – there may be questions on the exam not specifically addressed here but covered in class, the assigned reading, or the homework.

Things to help you study:

Class notes
Homework assignments
Assigned reading
Animations posted on the web
This Review Sheet
Midterm

General Solar System

- Basics about the planets: names, size, composition, inner/outer planets
- Missions that have explored the planets (ones we have focused on)
- Kinds of instruments and major observations from missions
- How do the planets all relate to one another? What do they have in common?

Mercury

- Exploration: Mariner 10, Arecibo, Messenger
- Using radar to determine rotation rate (Doppler shift)
- Spin-orbit coupling of Mercury
- A solar day on Mercury and relation to orbital and rotation period
- Internal structure, especially the core (size, solid?, liquid?, both?)
- Magnetic field observations and possible origin of magnetic field
- Cratering on Mercury compared with the Moon
- Outstanding questions about Mercury

Venus

- Exploration: Venera, Magellan
- Rotation, orbit (day vs. year)
- Magellan mission – when, types of data set (radar, topography, etc.)
- Density, internal structure
- Atmosphere (composition) and surface conditions (temperature, pressure)
- Greenhouse effect
- Earth and Venus - similarities and differences in basic properties, processes

- Types of tectonics
- Radar images: what makes them bright or dark?
- Geography of Venus: plateaus, highlands, plains/lowlands
- Venus surface features: volcanoes, coronae, impacts
- Types of volcanoes (shields, pancake domes)
- Coronae: what are they?
- Craters: implications for surface age
- Mapping geology from radar images

Earth

- Seasons
- Tides
- Phases of the Moon
- Eclipses
- Continental Drift – evidence used to propose it
- Additional evidence use to formulate seafloor-spreading / plate tectonics hypotheses
- Variations in seafloor bathymetry
- Seafloor magnetic “stripes”
- What is a plate? (lithosphere!)
- Plate tectonics – driving mechanisms, motions of plates
- Earthquakes and volcanoes – global distribution
- Seismic waves: what they tell us about Earth’s interior
- Volcano types and structure
- Types of plate boundaries: mid-ocean ridges, subduction zones, transform faults (major examples too)
- Hotspots – what are they?

The Moon

- Exploration: orbiters, landers (how many, when, approximate locations)
- Lunar samples: what they can tell us, types
- Internal structure (how we know)
- Rotation and orbit periods
- Geography – highlands, near side/far side differences, basins (Orientale and Imbrium)
- Lunar maria
- Atmosphere (or lack there of)
- Craters - formation, different types (simple, complex, basins, ray craters), using them to establish relative ages of regions
- Moonquakes: characteristics, how they differ from earthquakes
- Formation and evolution of Moon – different hypotheses and arguments for and against

Moon/Earth System

- Why we see the same side of the Moon
- Tides
- Phases of the Moon

Mars

- Northern-southern hemisphere differences
- General geography (names of major features)
- Moons
- Martian Meteorites
- Ice Caps
- Remnant magnetization – Evidence for prior magnetic field
- Resurfacing events – age of north and south
- Current and recent missions (what have they discovered?)
- Seasons
- Evolution of Mars
- Evidence for past water

Asteroids, Meteors, and Comets

- Origin and ages
- Where they come from, orbit types
- Composition, sizes
- Exploration
- Meteor showers & relationship to comets
- Major impacts (Chicxulub, Meteor Crater)
- How they are collected (meteorites)
- Comet tails
- What they can tell us about the solar system
- Shoemaker/Levy 9

Jupiter

- Internal structure, molecular vs. metallic hydrogen
- Magnetic field, radiation, aurora
- Great Red Spot
- Atmospheric features (clouds, belts)
- Rings
- Exploration: Galileo, Voyager, etc.
- Impact by comet (which one?)

Jovian (Galilean) Satellites

- Tidal heating
- Magnetic fields, relationship to Jupiter
- Volcanism, reasons for heat flow
- Surface compositions and color
- Compositional changes, internal structure, and density
- Possibility for life
- Orbital resonance
- Surface ages
- Important characteristics of each

Saturn

- Composition (like what other planet?)
- Low density
- Rings – names, overall composition, characteristics, gaps
- Roche Limit
- Magnetic field (especially compared to Jupiter)
- Moons – are they all the same?
- Titan – why are we interested in it?
- Cassini-Huygens Mission (flybys + surface probe)

Neptune, Uranus, Pluto

- Compositions, density, reason for color
- Discovery of each
- Rings – how many, characteristics
- Uranus odd rotation
- Neptune active atmosphere: white spot, clouds
- Magnetic field
- Pluto – pros & cons for 'planet' status
- Charon

General Astronomy Topics

- Where are we in the universe?
- Historical Astronomers (Ptolemy, Copernicus, Galileo, Kepler)
- Kepler's 3 Laws
- Electromagnetic waves (light): sizes of wavelengths
- Optical vs radio telescopes
- Ideal locations for telescopes and why

Extra Solar Planets & Solar System Formation

- Methods of detection
- Characteristics: size, distance from star, orbit
- Discovery: when first one, name, how many now?
- How did our solar system form?
- Where are solar systems and stars being formed today?

Astrobiology

- What is it?
- 4 conditions for life
- Biomarkers – gas emissions
- Bodies being investigated for life: Mars, Europa, Titan
- Goldilocks conditions – why is Earth just right for life?
- Why can't gas giants support life? Mercury and the Moon?
- What does the Drake Equation calculate?

General Concepts

- Planetary interiors – compositional vs. mechanical layering
- Planetary magnetic fields: what causes them