

REVIEW FOR THIRD EXAM

1. Jupiter – know about interior (metallic hydrogen) and atmosphere, internal heat from continued gravitational contraction, strong magnetic field, Great Red Spot, other spot features, bands, slight ring
2. Saturn – as with Jupiter, and comparisons with Jupiter, know about shepherding satellites, internal heat is from helium draining
3. Uranus – discovery (Herschel), rings, atmosphere, peculiar magnetic field, extreme rotation tilt, know that it lacks internal heat
4. Neptune – discovery (Adams, Leverrier, and Galle), rings, atmosphere, also a peculiar magnetic field, comparisons with Uranus, it does have internal heat
5. Dwarf Planets – know this is a new class, and its current members include Pluto, Eris, Ceres (former asteroid), Haumea, and Makemake
6. Pluto – discovery (Tombaugh), more of an iceball, an eccentric orbit, highly inclined orbit to the ecliptic, significant tilt of rotation axis, its moon is Charon
7. Eris – be aware it has a moon, be aware that it has a highly inclined orbit to the ecliptic
8. Comparative Planetology –
 - Jupiter and Saturn both have internal heat sources: how are they different? Know their respective origins.
 - Uranus and Neptune have magnetic fields that are greatly tilted from their rotation axes: why is this odd?
 - Uranus seems to lack internal heat, but Neptune does have it: why is this odd?
 - Pluto was thought to be an escaped moon from Neptune: why is that no longer favored?
9. Solar System Moons –
 - Galilean moons: Io, Europa, Ganymede, Callisto - know order and distinguishing properties, such as Io having volcanos, Europa possibly having subsurface oceans, Ganymede being the largest Solar System moon, and Callisto being the most cratered of the four; understand how tidal effects from Jupiter affect these moons
 - Titan - large moon of Saturn, know about its nitrogen rich atmosphere

- Triton - large moon of Neptune that has a retrograde orbit and shows geyser activity at its surface
 - Charon - moon of Pluto, relatively large in that it is not too much smaller than Pluto, Pluto and Charon are both in synchronous rotation with each other
10. Comets – know about components (nucleus, coma, two tails), highly eccentric orbits, the Oort cloud, Halley’s comet
 11. Asteroids – know about asteroid belt and Kuiper belt, impacts with Earth, also called minor planets, usually not massive enough for gravity to enforce a spherical shape, know about asteroid rotation and light curves
 12. Meteors – know about meteor showers, that most are associated with debris left from cometary orbits, know best time to view meteor showers, meteors vs meteorites vs meteoroids, know about radioactive decay
 13. Extra-solar planets
 - know about the different search techniques: eclipse, Doppler shift, astrometric, photometric, (microlensing)
 - know that the Doppler shift method has yielded most discoveries
 - know basic characteristics of detected planets: tend to be Jupiter mass, some are very odd in being in small short-period orbits (so-called hot Jupiters), some are multi-planet systems
 14. Life in the Universe
 - Essentials for life – water, carbon, radiation and heat, habitable zone
 - Searching for life – SETI, life in the solar system, rationale behind radio searches
 - Fermi question: “Where are they?”, and why this is relevant
 - Galactic colonization – relevant issues, typical time required
 - Drake equation – a useful way to estimate the number of inhabitable planets and intelligent civilizations based on assigned probabilities