

Name: __KEY_____

ERTH 1 – Planets
Instructor – Memorie Yasuda
Assigned – April 6, 2007
Due – April 13, 2007

Homework 1 – The Solar System (100 points total)

A. Formation of the Solar System (30 points)

Explain in one hundred words or less, how a solar system forms. The more significant points you cover, the more points you get. But the answer must be written in complete sentences, and it must be scientifically accurate and grammatically correct. You must use your judgment in prioritizing what's significant.

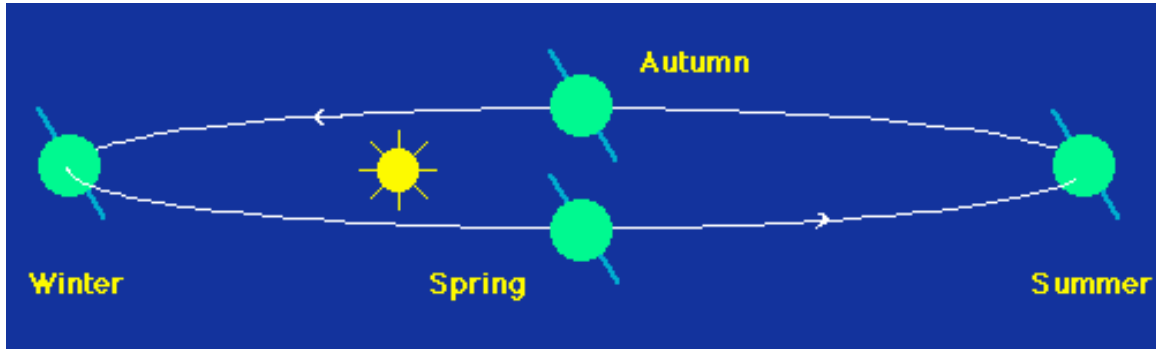
Summarizing Chapter 4.1: Interstellar gas and dust concentrated enough for self-gravitation to begin and conservation of angular momentum caused it to evolve to a disk. Conversion of potential energy into motion and then heat created a thermal gradient. Solid grains condensed where the temperature was below their freezing point, chemically sorting them. As grains collided they formed planetesimals a few km in diameter that attracted each other and accreted into protoplanets. Protoplanets collided and were usually fragmented but a few grew enough to survive and swept their orbits. Most remaining material was swept away by solar wind, but some planets grew so massive they captured uncondensed gas.

(107 words from MS Word: Tools/Word Count)

B. Is the Earth close or far from the Sun during winter? (10 points)

State your answer AND provide illustrations (include web addresses) that support your answer. Your grade on this question will partly depend on how much confidence the TAs has in your source of information. Again, you must use your judgment in evaluating sources of information.

Here is a link to an astronomy class at the U of Tennessee at Knoxville (aka Women's NCAA Basketball Champions)
csep10.phys.utk.edu/astr161/lect/time/seasons.html



The sun is closer in the northern winter, but the weather is colder because the Earth's axis of rotation is inclined about 23 degrees from its orbital axis.

C. Are there any planets visible in the night sky this week? (10 points)
(Between April 6 and April 13?)

List the planets if any and cite the source of your answer. Give the name and URL of your favorite online sky chart or viewer. (Check out the CD to your textbook too.)

All 5 naked eye planets (Mercury, Venus, Mars, Jupiter, and Saturn) are visible!
www.lightandmatter.com/area2planet

D. Explain why astrophysicists often like to consider that people are made of "stardust." (10 points)

Explain in one hundred words or less.

Our sun was too young to have created the elements such as carbon present when the solar system formed. Hence our bodies are made of materials from stars much older than our solar system that have exploded as novae and created the dust in the solar nebula.

E. Why do YOU think that the Earth revolves around the Sun, rather than the other way around? (30 points)

The planets exhibit retrograde motion, which is difficult but not impossible to explain in a geocentric description of the solar system. We see that other planets have moons that revolve around them, and Venus has a full

phase but is not visible at midnight.

F. Identify the most significant new observations, ideas or inventions that were conceived by each of the following individuals. (10 points)

1. Copernicus
2. Kepler
3. Galileo

Make sure to explain how each individual's contribution changed previous thinking.

Copernicus explained that the solar system must be heliocentric and that earth is not the center of the universe.

Kepler discovered that the orbits of the planets are not circles, the sun is at one focus, and that the orbital periods of –all- the planets obey one formula relating the orbital period to the semi-major axis.

Galileo used a telescope to discover the moons of Jupiter and the phases of Venus and proved the geocentric model of the solar system was wrong.