

Homework #11
AS101 Summer 2006
Dr. Withers

Assigned: 2006.06.19
Due: 2006.06.21, start of class

1) Read Chapter 11

2) Purpose: Understand interior structure of jovian planets
Earth is made mainly of rock and metal. Most of the rock is in the mantle and most of the metal is in the core. Jupiter contains rock and metal as well. Which layer of Jupiter's interior contains most of the rock? Which layer contains most of the metal?

| | |
|----------------------------------------|-----------|
| Most of Jupiter's metal is in the core | 10 points |
| Most of Jupiter's rock is in the core | 10 points |
| Plus more points if you got both right | 5 points |

3) Purpose: Think about the moons of the jovian planets
Name two moons of jovian planets. Describe one thing that you find interesting about each of the moons.

| | |
|--------------------------------------------------------|-------------------|
| Naming two moons correctly | 5 points for each |
| Describing two features accurately | 5 points for each |
| Plus more points if you get two moons and two features | 5 points |

4) Purpose: Understand rings
Which of these statements is most accurate?
A) Only three of the four jovian planets have rings
B) Saturn's rings have always been as bright as they are today
C) Saturn's moons have no effect on Saturn's rings
D) Ring particles are made mostly of water ice
D) Ring particles are made mostly of water ice

5) Purpose: Mathematical exercise

Saturn's rings are 250,000 km wide, but only 50 m thick. If the rings could be shrunk so that they are only 10 cm wide, how thick would they be?

Writing that:

New thickness / 10 cm = 50 m / 250,000 km 5 points

Unsuccessfully attempting to convert some units 5 points

Successfully converting 10 cm, 50 m, and 250,000 km into the same units 5 points

New thickness / 0.1 m = 50 m / 2.5×10^8 m

New thickness = $0.1 \text{ m} \times 50 \text{ m} / 2.5 \times 10^8 \text{ m}$

New thickness = $2 \times 10^{-8} \text{ m} = 20 \text{ nm}$ 10 points

This is shorter than the 500 nm wavelength of light!