

Homework #12  
AS101 Summer 2006  
Dr. Withers

Assigned: 2006.06.22  
Due: 2006.06.23, start of class

1) Read Chapter 12

2) The typical density of a comet is  $1 \text{ g / cm}^3$ . What is this density in units of  $\text{kg / m}^3$ ?

$$\begin{aligned} 1 \text{ g / cm}^3 &= 1 \text{ g / 1 cm}^3 \times (1 \text{ kg / 1000 g}) \times (100 \text{ cm / 1 m})^3 \\ &= 1 \text{ g / 1 cm}^3 \times (1 \text{ kg / 1000 g}) \times (10^6 \text{ cm}^3 / 1 \text{ m}^3) \\ &= 1 \text{ kg / 1 m}^3 \times (1 \text{ g / 1000 g}) \times (10^6 \text{ cm}^3 / 1 \text{ cm}^3) \\ &= 1 \text{ kg / 1 m}^3 \times (1 / 10^3) \times (10^6) \\ &= 1 \text{ kg / 1 m}^3 \times 10^3 \\ &= 10^3 \text{ kg / m}^3 \end{aligned}$$

Writing that  $1 \text{ kg} = 1000 \text{ g}$  and  $100 \text{ cm} = 1 \text{ m}$  10 points

Starting to do the calculation correctly 5 points

Getting the right answer 10 points

3) Why are there gaps in the asteroid belt?

Mention of "Jupiter" 5 points

Mention of either "gravity" or "orbital resonance" 10 points

Description of how any asteroid in these gaps experiences a gravitational tug from Jupiter at the same place in its orbit every time it passes Jupiter. 10 points

4) Which formed closer to the Sun - objects in the Oort Cloud (source of long-period comets) or objects in the Kuiper Belt (source of short-period comets)?

Oort Cloud objects 25 points

Oort Cloud objects formed between Jupiter and Neptune, but were flung far out to the outer regions of the solar system by the gravitational forces of the jovian planets.

5) The impact of an asteroid or comet led to the extinction of the dinosaurs 65 million years ago. Read the relevant section in the textbook and decide which of the following statements is most accurate.

A) By an unexpected coincidence, New York City was built at the same place that this impact hit Earth.

B) The presence of iridium, a rare metal, in rocks dating from 65 million years ago is strong evidence for an asteroid or comet hitting Earth at that time

C) Dinosaurs died because the impact melted the entire crust of Earth

D) The chance of an impact as large as the impact that killed the dinosaurs happening in the next 20 years is 50%.

B) The presence of iridium