Name: _____

April 26, 2012 – Spring 2012

TA's Name & Section (2 pts): _

Answer all questions in the space provided. If you have any questions, raise your hand. 100 points possible. NO CALCULATORS OR ANY ELECTRONIC DEVICES.

Below is the phase diagram for the substance Below is a diagram showing the orbits of 4 satellites TYLIUM. Orbiting a planet.





4 (2 pts) Which orbit has the longest period?

- (a) A
- (b) B
- (c) C
- (d) D

5 (2 pts) Which orbit has the greatest eccentricity?

- (a) A
- (b) B
- (c) C
- (d) D

 ${\bf 6}~(2~{\rm pts})$ Which orbit has the smallest semi-major axis?

- (a) A
- (b) B
- (c) C
- (d) D

7 (2 pts) Which orbit has the satellite that has the greatest *variation* in the speed of the satellite during the orbit?

- (a) A
- (b) B
- (c) C
- (d) D

- 1 (2 pts) What is the phase of TYLIUM in this room?
 - (a) Liquid
 - (b) Solid
 - (c) Gas

2 (2 pts) What is the phase of TYLIUM high in the Earth's atmosphere?

- (a) Liquid
- (b) Solid
- (c) Gas

3 (2 pts) What is the phase of TYLIUM at the bottom of a deep Earth ocean?

- (a) Liquid
- (b) Solid
- (c) Gas

8 (10 pts) In the space below, sketch and label a **crater density diagram** for a surface on (**A**) an Earthsized world with a thick atmosphere, and (**B**) a surface on a Mars-sized world with no atmosphere. Assume **both** surfaces have the same age (0.7 billion years old).

9 (8 pts) Explain why neither of these surfaces would have large impact basins (> 1,000 km) on them.

10 (4 pts) Assume you have discovered a world with a density of 4.41 g/cm³. What is the most likely composition of this world?

11 (6 pts) Explain why the moment-of-inertia of this world would change if it were to differentiate.

12 (8 pts) Assume that this world has the same gravity as the Earth, but is only 1/2 as large. How would the mass of this world compare to the Earth's?

13 (10 pts) Explain why carbon (CO_2) is removed from the atmosphere of the Earth, but not from the atmosphere of Venus.

14 (6 pts) Explain why all of the impact craters discovered on the Earth are ghost craters.

15 (8 pts) All of the material in our solar system formed about 4.5 billion years ago. However, rocks on the Earth have ages that range from 3 billion to 0 years old. Explain how this can be.

16 (8 pts) Explain why, in the Giant Impact Theory, it is important that the Moon formed from only the crust of the two impacting worlds.

For each of the surfaces pictured below, tell me: (1) The most likely rock type found on the surface, (2) The most probable age of the surface (I want a number with units), (3) How the age of the surface was determined, and (4) What processes are modifying the surface TODAY.



 ${\bf 17}~(8~{\rm pts})$ Apollo ${\bf 12}$ landing site - Lunar Mare

Rock Type: _____

Surface Age: _____

How surface age determined:

Processes modifying surface today:



 $\mathbf{18}~(8~\mathrm{pts})$ Viking I landing site - Mare

Rock Type: _____

Surface Age: _____

How surface age determined:

Processes modifying surface today: