Dec 09, 2013 – Autumn 2013

Name: _____

TA's Name & Section:

Answer all questions in the space provided. If you have any questions, raise your hand. 100 points possible. No calculators or electronic devices of any type.

1 (2 pts) What is the moment-of-inertia of a carbonaceous chondrite meteorite's parent body?

- (a) 0.32
- (b) 0.37
- (c) 0.40
- (d) 0.66

2 (2 pts) What is the moment-of-inertia of an iron meteorite's parent body?

- (a) 0.32
- (b) 0.37
- (c) 0.40
- (d) 0.66

3 (2 pts) What is the diameter of a carbonaceous chondrite meteorite's parent body?

- (a) 1 km
- (b) 10 km
- (c) 100 km
- (d) 1,000 km

4 (2 pts) What is the diameter of an iron meteorite's parent body?

- (a) 1 km
- (b) 10 km
- (c) 100 km
- (d) 1,000 km

5 (2 pts) What is the density of a carbonaceous chondrite meteorite's parent body?

- (a) 1.0 g/cm^3
- (b) 3.0 g/cm^3
- (c) 5.0 g/cm^3
- (d) 8.0 g/cm^3

6 (2 pts) If you were to blow the Earth's Moon into pieces, the most common type of material would be:

- (a) carbonaceous chondrite-like material
- (b) ordinary chondrite-like material
- (c) rocky achondrite-like material
- (d) iron achondrite-like material

7 (2 pts) Which of the following objects would have the most volatile-rich surface?

- (a) A tidally heated world
- (b) A dead world at 1 AU
- (c) A comet at 1 AU
- (d) A kuiper belt object

8 (2 pts) Jupiter takes about 12 years to go around the Sun. What is the period of an asteroid in a 6:1 resonance with Jupiter?

- (a) 1 year
- (b) 2 years
- (c) 4 years
- (d) 6 years

9 (2 pts) The atmosphere of Jupiter has a composition that most closely matches the atmosphere of:

- (a) Earth
- (b) Venus
- (c) Titan
- (d) The Sun

10 (4 pts) What does it mean when we say a material is volatile?

11 (4 pts) What does it mean when we say a material is **primitive**?

 ${\bf 12}~(8~{\rm pts})$ Explain why a primitive surface is rich in volatile material.

13 (8 pts) Explain why we believe that planets are very common in our galaxy.

 ${\bf 14}$ (8 pts) Explain why short-period comets cannot exist for a billion years.

 ${\bf 15}$ (8 pts) Explain why the magnetic field of Jupiter is so much stronger than the magnetic field of the Earth.

16 (8 pts) Explain why the orbit of Jupiter changes (migrates) over the age of the solar system.

17 (8 pts) Explain why an object in a perfectly circular orbit around Jupiter will not be tidally heated.

18 (8 pts) Explain why the composition of Titan's atmosphere is very different from the composition of Venus' atmosphere.

19 (8 pts) Describe how the *Crater Population* on the surface of a geologically dead world in the outer solar system is different than the crater population on the highlands of the Earth's Moon (assume both are crater saturated).

20 (10 pts) In the space below, draw and label the reflectance spectra of the surface of a typical dead satellite in the outer solar system (visible part of the spectrum only).