ASTRONOMY 150 – FINAL Name: _____

December 16, 2009 – Autumn 2009 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 (3 pts) Jupiter takes about 12 years to orbit the sun. An asteroid in 4:1 resonance with Jupiter would orbit the sun in how many years?

(a) 3 years
(b) 48 years
(c) 12 years
(d) 16 years
(e) 1/4 year

2 (3 pts) A small (< 200 km) object formed at a distance of 0.5 AU from the sun would have a density of about

(a) 1 g/cm^3
(b) 3 g/cm^3
(c) 8 g/cm^3

3 (3 pts) A small (< 200 km) object formed at a distance of 15 AU from the sun would have a density of about

(a) 1 g/cm^3
(b) 3 g/cm^3
(c) 8 g/cm^3

4 (3 pts) A planet with a mass of 10 times that of Jupiter will have a size

(a) 10 times greater than Jupiter
(b) 10 times less than Jupiter
(c) about the same as Jupiter
(d) that can have any value

5 (3 pts) Which of the following atmospheric gasses would be a strong indicator of a potentially biologically rich world?

(a) Carbon Dioxide (CO_2)
(b) Ozone (O_3)
(c) Nitrogen (N_2)
(d) Methane (CH_4)

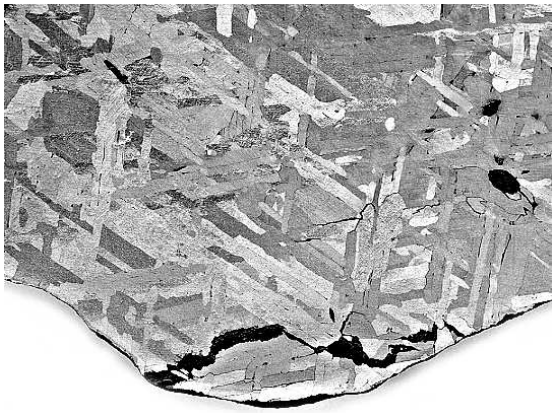
6 (8 pts) Describe how you can determine the composition of the surface of an asteroid *without* having a sample.

7 (8 pts) Explain how we can determine how far an extrasolar planet is from its star, even though we cannot see the planet.

8 (8 pts) I have said that we **cannot** use crater counting to determine the ages of the worlds in the outer solar system. Describe what the evidence is that supports this statement.

9 (8 pts) Venus, Earth, Mars, and Titan are terrestrial worlds with **secondary** atmospheres. Explain why the composition of Titan's atmosphere is very different from the composition of Venus' atmosphere.

10 (6 pts) On the right is an image of a slice of a meteorite. Identify the meteorite and describe the characteristics of this slice that identifies it.



11 (5 pts) Is this sample *primitive*? Explain.

12 (8 pts) Describe the approximate **size**, **shape**, **density**, and **moment-of-inertia** of the *parent body* of this sample.

13 (8 pts) Explain why Io would **not** be tidally heated if it had a perfectly circular orbit around Jupiter.

14 (8 pts) Describe **two** pieces of evidence that imply *most* of the asteroids in the asteroid belt are small in size (< 500 km). [Going to the asteroid belt and taking pictures is **not** one of them.]

15 (8 pts) Explain why accretion is not very efficient for particles that are very close to giant planets such as Saturn.

16 (8 pts) Explain why accretion is not very efficient for particles in the very outer regions (> 30 AU) of the solar system.

17 (2 pts) And finally, list the top 100 objects in the solar system.