ASTRONOMY 150 – FINAL Name: _____

December 14, 2005 – Autumn 2005 TA's Name & Section: _____

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

1 (3 pts) To begin with, list the top 100 objects in the solar system.

2 (3 pts) In studying the surfaces of solid worlds in the solar system, we have learned that the number of craters (per unit area):

(a) is about the same on every world
(b) is greater as you get close to the Sun
(c) is roughly proportional to the age of the surface
(d) is greater as you get farther and farther from the Sun
(e) follows no discernible rules or relationships

3 (3 pts) What is the most common geological feature on the surfaces of dead worlds?

(a) impact craters
(b) lava channels
(c) lava flows
(d) straight rilles
(e) shield volcanoes

4 (3 pts) Which of the following extra-terrestrial samples is the most primitive?

(a) a lunar impact breccia
(b) a cometary particle
(c) an iron meteorite
(d) a basalt from Venus
(e) a rock from the surface of Io

5 (3 pts) Why do meteor showers never produce meteorites?

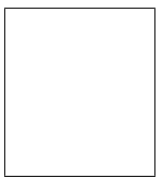
(a) Iron meteorites are formed in the core, not the atmosphere
(b) Meteor showers are composed of small cometary matter
(c) Meteor showers are actually only high energy particles from the Sun
(d) The Earth's atmosphere is too thin
(e) The Earth's magnetic field deflects the meteors

6 (3 pts) The gaps in the rings of Saturn are caused by:

(a) A large moon sweeping up ring particles
(b) The ring particles resonating with Jupiter changing the particles' orbits
(c) Saturn's large magnetic field
(d) Volcanic activity from Enceladus expelling the ring particles
(e) The ring particles resonating with moons changing the particles' orbits

7 (8 pts) We do **not** have samples from the surface of Mercury or Jupiter's moon Callisto. Both have the same level of current geological activity (none). We have much better photographic coverage of Callisto than we do of Mercury. Explain why we are more confident of the age of **Mercury's** surface.

8 (8 pts) Why you would expect to discover more planetary systems like our solar system (Jupiter-sized planets at large distances) as more and more observations are made.



9 (8 pts) Explain why the atmosphere of Saturn's moon Titan has a composition that is very different from the atmosphere of Mars.

10 (8 pts) Explain why Titan would lose its atmosphere if you moved the Saturn system to Mercury's position in the solar system (0.4 AU), but Saturn would not.

11 (8 pts) Explain why there are no large moons within the Roche limit of Saturn.

12 (8 pts) Explain why it was possible to form a 10 Earth-mass solid object out at Jupiter's position (5 AU), and not at Earth's position (1 AU).

13 (8 pts) Explain why there are no 4.5 billion-year-old short-period comets.

14 (8 pts) About all we know of the surface appearance of Kuiper Belt Objects (KBOs) is that they are dark and red. In the space below, sketch the visible reflectance spectra of a KBO. Make sure the axes have labels and ranges.

The asteroid 2004 XY60 orbits closer to the Sun than the Earth and is very nearly in a 2:1 resonance with the Earth's orbit. The asteroid is small, only 100 meters across at its widest point.

15 (4 pts) How long does it take 2004 XY60 to orbit the Sun?

16 (6 pts) What is the most likely shape of this asteroid? Make sure to explain your answer.

17 (8 pts) What would likely be the most common type of rock found on the surface of 2004 XY60? Make sure to explain your answer.