ASTRONOMY 150 – FINAL Name: _____

March 15, 2006 – Winter 2006 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) I said that the surface of Saturn's moon Mimas is about 3.8 billion years old because it has about the same crater density as the highlands of the Earth's Moon. Why might this statement be completely wrong.

(a) Mimas is smaller than the Moon and therefore a smaller target.
(b) Mimas is a tidally heated world so geological activity removes most craters.
(c) Mimas may not have been hit by the same number and size of impactors as the Moon.
(d) Crater density has no relation to the age of a planetary surface.
(e) Saturn's ring have shielded Mimas from all but the largest. impacts

2 (6 pts) Rewrite the following statement so that is is true: "A sample return mission to Ceres, the largest asteroid in the solar system, would return materials similar in composition to carbonaceous chondrite meteorites."

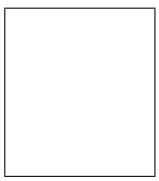
3 (8 pts) Explain why we would have *far fewer* meteorites on the Earth if we did not have Jupiter in our solar system.

4 (3 pts) The Roche limit for Uranus lies about 2.5 planetary radii away. This distance is:

(a) at the orbit of Miranda.
(b) near the inner edge of the rings.
(c) at the largest gap in Uranus' rings.
(d) near the outer edge of the rings.
(e) just beyond the orbit of the outermost satellite.

5 (6 pts) Rewrite the following statement so that is is true: "The magnetic field of Mars was much stronger in the past. Over time, the rotation rate of Mars has slowed down, decreasing the strength of the magnetic field."

6 (8 pts) Explain why we know that the *smallest* body that produced an iron meteorite was larger than the *largest* body that produced a carbonaceous chondrite meteorite.



7 (3 pts) Halley's comet takes about 76 years to orbit the Sun. Why do we believe that Halley's comet was not in its present orbit 4 billion years ago?

(a) It would have completely disintegrated if it had been in this orbit for 4 billion years
(b) Jupiter would have sent it into the Oort cloud if it had been in this orbit for 4 billion years
(c) Halley's comet is too large to have a stable orbit for 4 billion years
(d) 4 billion years ago comets have not yet formed in the solar system.

8 (6 pts) Rewrite the following statement so that is is true: "The methane in Titan's atmosphere breaks down in about 10 million years. This means that in 10 million years Titan will not have an atmosphere."

9 (8 pts) Explain why secondary atmospheres in the outer solar system have a very different composition from secondary atmospheres in the inner solar system.

10 (3 pts) Which of the following is the best piece of evidence that ordinary chondrite meteorites have been heated more than carbonaceous chondrite meteorites?

(a) Carbonaceous Chondrites have a lower albedo than Ordinary Chondrites.
(b) Ordinary Chondrites have less volatile material than Carbonaceous Chondrites.
(c) Ordinary Chondrites have a higher density than Carbonaceous Chondrites.
(d) There are fewer Carbonaceous Chondrites than Ordinary Chondrites.
(e) Ordinary Chondrites are made of stronger material than Carbonaceous Chondrites.

11 (6 pts) Rewrite the following statement so that is is true: "There is an observation bias for detecting large planets far from their central star, since at a large distance the light from the central star is much weaker."

12 (6 pts) Explain why Jupiter-sized objects probably do not **form** inside the snow-line.

13 (3 pts) How does the Density, Albedo and amount of volatile material change as you move *farther* away from the Sun.

(a) Density **increases**, albedo **increases** and volatility **increases**.
(b) Density **decreases**, albedo **decreases** and volatility **decreases**.
(c) Density **decreases**, albedo **increases** and volatility **increases**.
(d) Density **increases**, albedo **decreases** and volatility **decreases**.

14 (6 pts) Rewrite the following statement so that is is true: "The particles of the rings of Saturn are a moon that never formed due to the large magnetic field of Saturn repelling the particles."

15 (8 pts) In the space below, sketch the reflectance spectrum of Basalt. Make sure to provide a range and label for the axes.

16 (3 pts) Jupiter has an orbital period of about 12 years. Which of the following asteroids would have the shortest lifetime in its current orbit?

(a) an asteroid with a period of 4 years.
(b) an asteroid with a period of 5 years.
(c) an asteroid with a period of 7 years.
(d) an asteroid with a period of 11 years.
(e) an asteroid with a period of 13 years.

17 (6 pts) Rewrite the following statement so that is is true: "Pluto is a planet."

18 (6 pts) Explain why a Jupiter-sized planet with a very eccentric orbit is bad for life on the Earth.

19 (2 pts) List the top 100 object in the solar system.