ASTRONOMY 150 – MIDTERM Name: _____

February 2, 2006 – Winter 2006 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.

On the right is a table of the physical properties of the planet MAGRATHEA. This planet is located at a distance of **1 AU** from a star *exactly* like our Sun. Assume that this planet is made of the same materials as the planets in our solar system. Use the data in the table to answer the question on the next five pages.

Read through the table carefully before you answer the questions.

MAGRATHEA	
Density	3.8 g/cm^3
Moment of Inertia	0.33
Albedo	0.66
Size	50% Earth
Mass	10% Earth
Atmosphere Pressure	1.5 atm
Atmosphere Composition	95% CO_2

1 (4 pts) What is the most likely composition of MAGRATHEA?

2 (5 pts) Describe how the mass is distributed in the interior of MAGRATHEA.

3 (6 pts) How does the surface gravity on MAGRATHEA compare to the gravity on the Earth? [show your work]

4 (6 pts) Explain why the rate of heat loss from the interior of MAGRATHEA is greater than the Earth's.

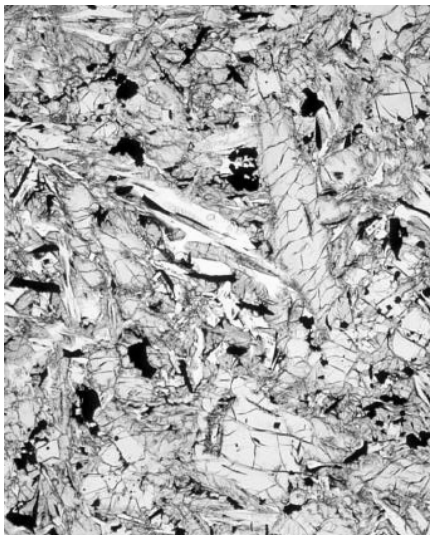
5 (6 pts) Observations suggest that MAGRATHEA has currently active volcanoes on its surface. Explain why this is unexpected.

6 (6 pts) How would the size of the volcanoes on MAGRATHEA compare to the size of similar types of volcano on the Earth. Explain your answer.

7 (4 pts) What does the Albedo tell you about the rocks on the surface of Magrathea?

8 (6 pts) How would the surface temperature on Magrathea compare to the surface temperature on the Earth's? Explain your answer.

9 (6 pts) Would you expect to find liquid water on the surface of Magrathea? Explain your reasoning.



10 (3 pts) On the left is an image of a thin section of a rock from the surface of MAGRATHEA. Based on the lunar sample images you looked at in lab, what type of rock is it? (check one)

◯ Basalt
◯ Breccia
◯ Regolith
◯ Pristine Highland Rock

11 (6 pts) Describe how the parent rock formed. (The parent rock is the rock from which this thin–section was taken.)

12 (8 pts) Explain whether this rock would be rare or common on the surface of the Earth 2 billion years ago and why.

13 (8 pts) The rock from the previous page was collected from the rim of a 100-meter diameter impact crater. How would the age of this rock compare to one found 500 meters from the rim? Explain your answer.

14 (8 pts) Assume that the population of objects that impact MAGRATHEA and the Earth's Moon are the same. In the space below sketch the **crater-density** plot for the crater population on the surface of MAGRATHEA. Make sure to provide a range and label for the axes.

15 (8 pts) Currently there are about 4000 objects that have the potential to hit the Earth. Explain how we know this number was **much** larger in the past.

16 (8 pts) The KT-boundary impact had a global effect on the Earth. Explain why the same sized impact on the Moon would not have the same consequences for the lunar environment.