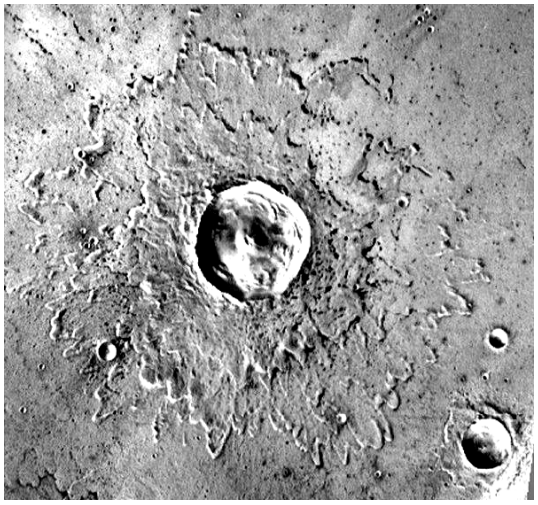
ASTRONOMY 150 – MIDTERM Name: _____

October 30, 2008 – Autumn 2008 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 OR ANY ELECTRONIC DEVICES.

1 (4 pts) What are the **two** primary factors that determine whether a world can hold on to an atmosphere over the age of the solar system?



2 (8 pts) Explain how this feature formed and how you know this feature is found on Mars and not the Moon.

3 (3 pts) Impact events on the Earth have a more global effect than they do on the Moon since the Earth:

(a) is a bigger target
(b) is more geologically active
(c) rotates faster
(d) has an atmosphere
(e) has a higher gravity

You have discovered a new world orbiting the Sun at a distance of 0.3 AU. This world is (1/3) the size of the **Moon**, and is (1/10) as massive. The world has an uncompressed density of 3.1 g/cm^3 and a moment-of-inertia factor of 0.39. (Use this information to answer the question on the next two pages).

4 (6 pts) How does the gravity of this world compare to the Moon's gravity? [Be quantitative; show your work.]

5 (4 pts) What is the most likely composition of this world? [Remember to give a qualitative indication of the amount of each substance.]

6 (3 pts) How is the mass distributed in the interior?

7 (6 pts) Would you expect the geological activity on this world to be greater or less than the Moon's? Explain your answer.

8 (8 pts) Explain why it is unlikely that this world has a thick atmosphere today.

9 (6 pts) Explain why it is **very** unlikely that a rock from the surface of this world would be 1 billion years old.

10 (4 pts) The most likely **types** of rocks from the surface of this world would be:

11 (8 pts) Explain why the lack of volatiles found in the Moon rocks is consistent with the **Fission** and **Giant Impact** theories of lunar origin.

12 (8 pts) Explain how you would determine the absolute age of the lava flow on the far side of the Moon. Assume you can **not** obtain a rock sample.

13 (8 pts) Explain why the interior of the Earth is currently hot enough to melt rock, and why this is **not** the case for the Moon.

14 (8 pts) Explain why the maximum height of the mountains on Venus are about the same as they are on the Earth, even though the atmospheric pressure on Venus is **much** greater that it is on the Earth.

15 (8 pts) Explain why the Earth's atmosphere would be more Venus-like if you removed all life from to Earth.

16 (6 pts) For the following worlds, what are **oldest** and **youngest** rock samples you would expect to find on their surfaces? Be quantitative (*i.e.* X billion/million/thousand years old).

The Moon: Oldest:_____ Youngest:_____

Venus: Oldest:_____ Youngest:_____

Earth: Oldest:_____ Youngest:_____