ASTRONOMY 150 – MIDTERM Name: _____

November 2, 2006 – Autumn 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.

1 (6 pts) How do we determine the age of the lava flow from the Apollo 12 landing site?

2 (6 pts) How do we determine the age of the lava flow on the floor of the Tsiolkovsky crater on the far side of the Moon.

3 (3 pts) **Iridium** is a siderophile (*i.e.,* iron-loving) element. Explain why Iridium is very rare in the crust of the present-day Earth.

You have discovered a new planet orbiting the Sun at a distance of 0.7 AU. This planet is one-half (1/2) the size of the Earth, and is one-twelve (1/12) as massive. The planet has an uncompressed density of 3.8 g/cm^3 and a moment-of-inertia factor of 0.34. (Use this information to answer the questions on the next two pages).

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

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

6 (2 pts) How is the mass distributed in the interior?

7 (8 pts) Explain why it is unlikely that this planet has a thick atmosphere today.

8 (6 pts) Would you expect the geological activity on this world to be greater or less than the current geological activity of the Earth? Explain your answer.

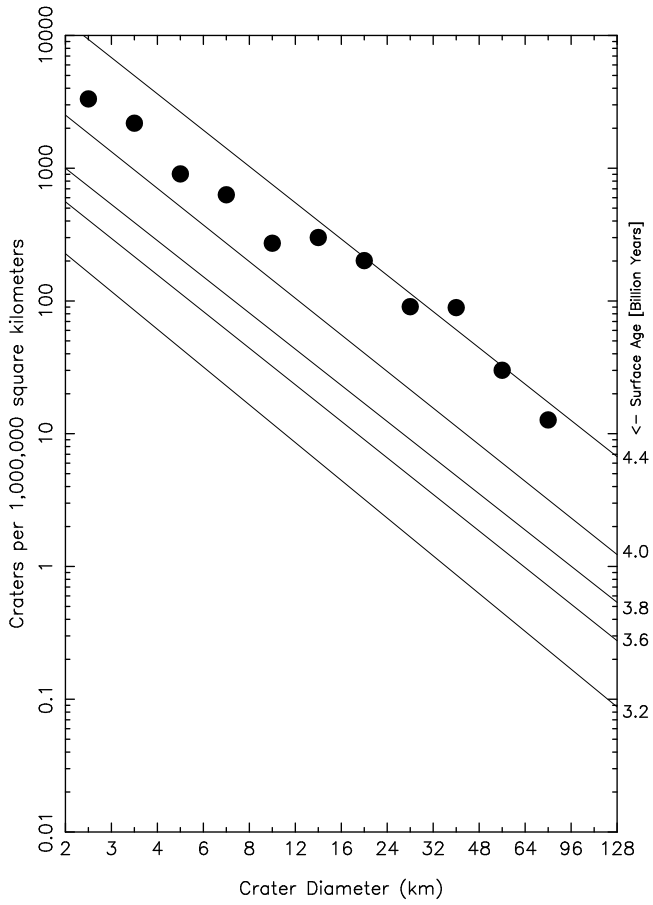
9 (4 pts) On the left is an image of a thin section of a rock from the **surface** of this planet. Based on the lunar sample images you looked at in lab, what type of rock is it? (check one)

◯ Basalt
◯ Breccia
◯ Regolith
◯ Pristine Highland Rock

10 (8 pts) A self proclaimed expert on this planet has claimed that the age of the rock above to be 10 million years old. Explain why 10 million years old is most likely **not** the correct age for this rock, and give your estimate on how old the rock would likely be.

11 (8 pts) Explain why rock samples collected on the surface of the Moon tend to get *older* as you approach an impact crater.

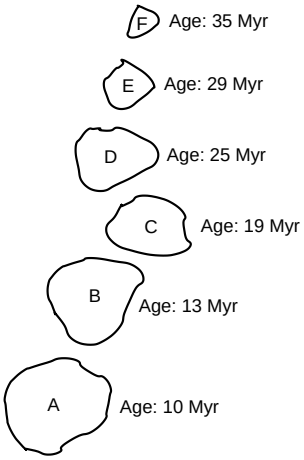
12 (8 pts) The Mars Exploration Rovers have found lots of evidence that some parts of the **surface** of Mars were wet in the past. I kept saying that this implies that the atmosphere of Mars was different in the past. Explain how it was different and why it needed to be.



13 (5 pts) The plot above shows the crater density plot of an Apollo landing site. Based on this data, tell me if this landing site was a highland or mare landing site. Be sure to explain your answer.

14 (5 pts) On the plot above, sketch and label a line that shows the crater density for the other type of landing site (Highland or Mare).

15 (5 pts) On the plot above, sketch and label a line that shows the crater density of a young surface of a world with a thick atmosphere.



On the left is a drawing of a piece of the surface of a world in the inner solar system showing a system of shield volcanoes (A-F). The numbers indicate the ages of volcanoes (in millions of years). Use the data in this drawing to answer the questions on this page.

16 (8 pts) Based on this data, would you assume that this world has plate tectonics? Explain your answer.

17 (6 pts) Explain why the ages of these volcanic regions were probably **not** determined by crater counting, even if that the world's atmosphere has little effect on the crater population.