ASTRONOMY 150 – MIDTERM Name: _____

May 1, 2003 – Spring 2003 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 (3 pts) Rocks have a density of about _____ g/cm^3, water has a density of _____ g/cm^3, and iron has a density of about _____ g/cm^3.

2 (4 pts) Write down the equation that describes the force of gravity between the Earth and the Moon. Explain what each of the variables means.

3 (8 pts) Describe how the Moment-of-Inertia of a planet changes as a planet differentiates (please be quantitative).

The table below shows the properties of three planets orbiting a star that is identical to our Sun. Use these data to answer the questions on this page.

Planet	Mass [Earth = 1]	Radius [Earth = 1]	Uncompressed Density [g/cm^3]	Moment-of-Inertia Factor [K]
Smaug	1/4	1/2	7.5	0.40
Fafner	1	1	5.8	0.35
Puff	4	2	3.0	0.30

For each of the three worlds, explain what the composition of the world is (2 pts), how the gravity compares to Earth's gravity [show your work] (3 pts), and how the mass is distributed in the interior (2 pts).

4 (7 pts) Smaug

Composition:

Gravity:

Interior Mass Distribution:

5 (7 pts) Fafner

Composition:

Gravity:

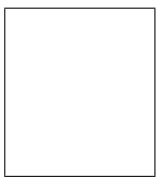
Interior Mass Distribution:

6 (7 pts) Puff

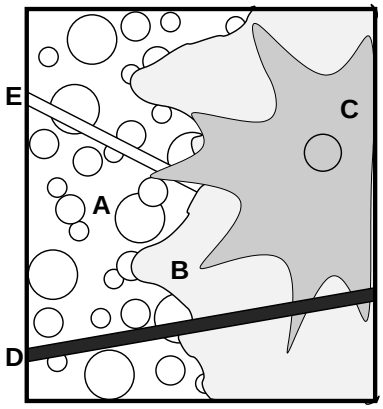
Composition:

Gravity:

Interior Mass Distribution:



7 (5 pts) Below is a geological map of a planetary surface. Indicate the **relative** ages of the various landforms from oldest - formed first (1) to youngest - formed last (5).



A - Cratered Terrain _____

B - Lava Flow _____

C - Crater and Ejecta _____

D - Straight Rille #1 _____

E - Straight Rille #2 _____

8 (4 pts) I said that the surface of Venus lacks *ghost craters*. What is a *ghost crater*?

9 (6 pts) I claimed that Venus was a geologically active world. I also claimed that there are very few *ghost craters* on Venus. Explain why these two fact contradict each other.

10 (8 pts) A typical secondary atmosphere starts out with about 40% CO_2. The Earth has very little CO_2 in its atmosphere (about 0.3%). Explain where the CO_2 in the atmosphere went and how it got there.

11 (8 pts) Describe how the crater size-distribution of a world with a thick atmosphere differs from that of a world without an atmosphere.

12 (5 pts) I said that it could be difficult to form life on the **surface** of the Earth 3.8 billion years ago. What was happening to the surface of the Earth (and all of the other terrestrial planets) at this time to make the formation of life difficult?

13 (10 pts) Most of the Earth's surface from 3.8 billion years ago is long gone. We have no rocks or features that existed 3.8 billion years ago. How do we know the event above happened 3.8 billion years ago and not at another time?

14 (10 pts) In the space above, draw what the reflectance spectra of a black ball would look like. Make sure to draw and **label** both of the axes.

15 (6 pts) Explain why the Earth's geological activity has lasted much longer than the Moon's.