ASTRONOMY 150 – MIDTERM Name: _____

October 31, 2002 – Autumn 2002 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.

0 (3 pts) Iron has a density of about _____ g/cm^3, water has a density of _____ g/cm^3, and rocks have a density of about _____ g/cm^3.

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

Planet	Mass [Earth = 1]	Diameter [Earth = 1]	Uncompressed Density [g/cm^3]	Moment of Inertia Factor [K]	Average Distance from star [AU]
LESTAT	1/8	1/2	5.0	0.40	0.3
DRACULA	1	1	5.0	0.30	0.7
NOSFERATU	2	$1\frac{1}{4}$	4.0	0.32	1.0
SPIKE	1/3	1/4	4.5	0.38	1.5

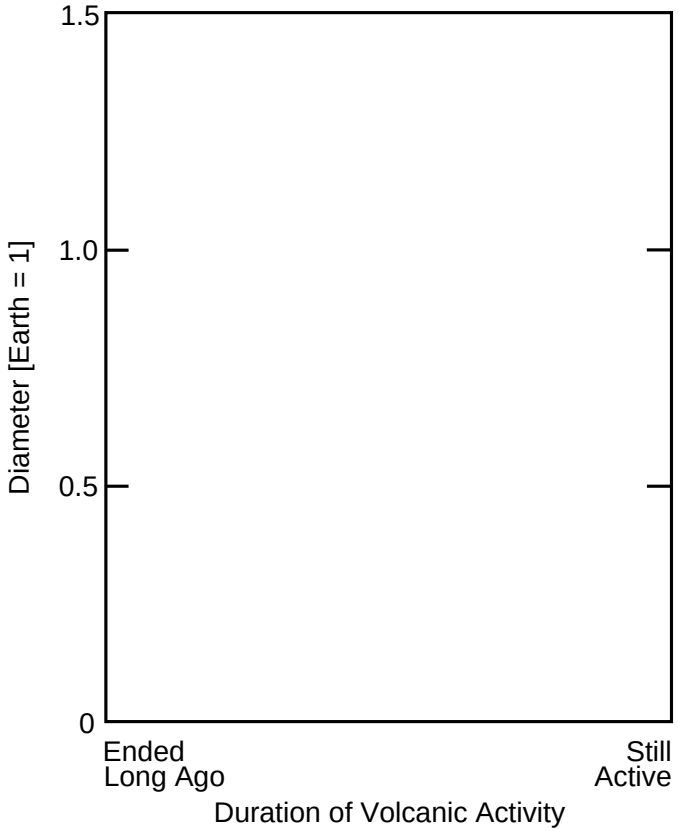
1 (4 pts) If we assume that these planets are made of the same materials as our solar system (ice, rock, and iron) what is the most likely composition of the planet LESTAT?

2 (6 pts) Assume that planet LESTAT and DRACULA have the same composition. Explain why gold would be more common on the surface of LESTAT than DRACULA.

3 (6 pts) How does the gravity on planet LESTAT compare to the gravity on planet DRACULA? [Show your work.]

4 (6 pts) Assume that the planets LESTAT and DRACULA have the same surface temperature. Explain which one is more likely to have an atmosphere.

5 (6 pts) Explain why we **cannot** use crater counting to determine the age of any of these surfaces.

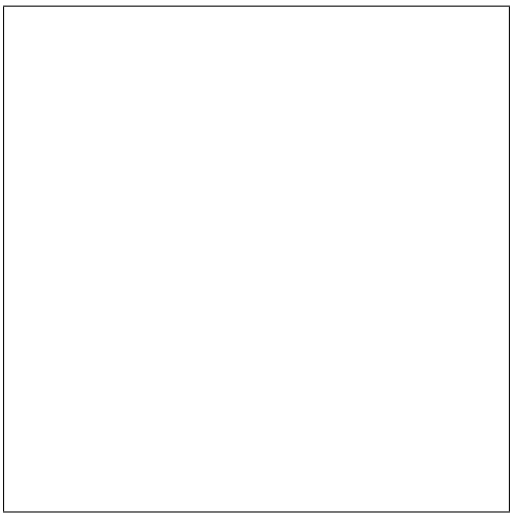


6 (10 pts) Using the data from the first page, determine the duration of volcanic activity of each of the four worlds. The duration will range from "Ended Long Ago" to "Still Active Today." Assume that "Long Ago" is about 4 billion years ago. Now, plot the duration vs. diameter on the graph on the left. Make sure that you label your points with the names of the worlds.

7 (5 pts) You noticed in your plot that the duration of geological activity varies from world to world. What causes a geologically active world to end its activity and become a dead world?

8 (5 pts) Impact Breccia is very common on the surface of the Moon. Explain how Impact Breccia is formed.

9 (5 pts) Impact Breccia is **not** very common on the surface of Venus. Explain why this is.

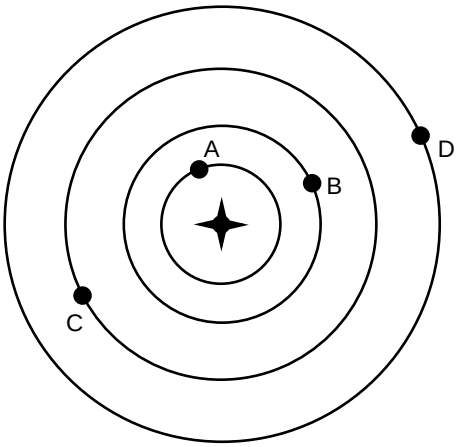


10 (5 pts) In the box on the left, sketch what a thin section of a sample of Impact Breccia looks like. List its distinguishing characteristics below.

11 (6 pts) Helium is the second most common gas in the universe. Explain why Mars does not have any Helium in its atmosphere.

12 (6 pts) Explain how we determine that the volcanic plains on Mars are about 500 million years old.

13 (6 pts) The Earth has only a few impact craters visible on its surface. Yet we believe that in the past the Earth was covered by impact craters. Explain why we believe the Earth was **heavily** bombarded in the past?



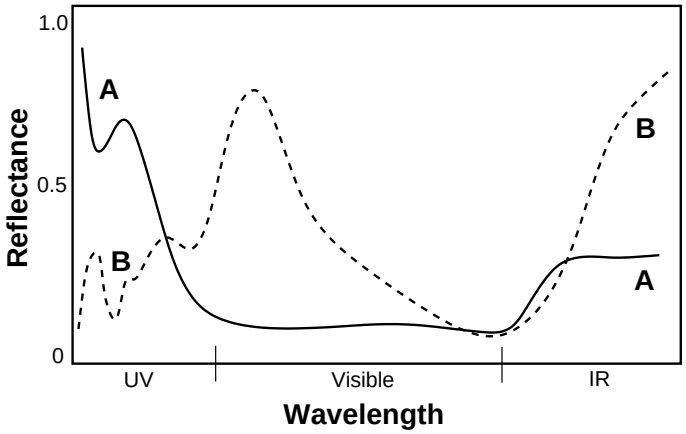
For the next three questions, assume that you are standing on Planet **B**

14 (2 pts) Which planet is overhead at noon?
◯ A ◯ B ◯ C ◯ D

15 (2 pts) Which planet is overhead at midnight?
◯ A ◯ B ◯ C ◯ D

16 (2 pts) Which planet orbits fastest?
◯ A ◯ B ◯ C ◯ D

On the right is the reflectance spectrum of two rocks. Rock **A** = solid line; Rock **B** = dotted line. Use this information to answer the questions below.



17 (5 pts) Describe what rock **A** looks like (color and brightness).

18 (5 pts) Describe what rock **B** looks like (color and brightness).

19 (3 pts) The European honey bee (*Apis Mellifera*) has eyes that are sensitive in the ultraviolet. Describe how the brightness of the two rocks would appear to this bee.