ASTRONOMY 150 - EXAM #2 Name: _____

November 19, 1999 TA's Name & Section: _____

Answer all questions in the space provided. If you have any questions, raise your hand. 100 points possible.

1 (6 pts) Most of the meteorite we collect on the Earth are pieces of the asteroid belt. The asteroid belt is a collection of bodies with orbits between Mars and Jupiter. Explain how the orbits of meteorites can be changed so that they can eventually impact the Earth.

2 (6 pts) Which would most likely hit the Earth at a higher velocity: A comet with a prograde orbit or a comet with a retrograde orbit? Explain why.

3 (5 pts) It it believed that a comet hit the Earth in 1908 over Soviet Siberia. The explosion leveled a forest but left no impact crater. Explain how this can be.

A lot of the facts that we have learned in this class come from analyzing extraterrestrial materials. On the right is a table of 4 extraterrestrial samples we have discussed in class.

For each of the following five facts, name the which sample was used to determine the fact (2 pts) and how the sample allowed us to determine the fact (5pts).

Sample	**Collection Point**
Moon Rock - Impact Breccia	Imbrium Basin, Apollo 15
Meteorite - Iron	Odessa, Texas
Meteorite - Carbonaceous Chondrite	Antarctica
Cometary Particle	Upper Atmosphere

4 (7 pts) *Fact #1*: The Earth was heavily bombarded 3.8 billion years ago.

Sample used:

5 (7 pts) *Fact #2*: The Solar system formed 4.5 billion years ago.

Sample used:

6 (7 pts) *Fact #3*: Some asteroids are very differentiated.

Sample used:

7 (7 pts) *Fact #4*: The Sun's composition is different from other stars.

Sample used:

8 (7 pts) *Fact #5*: The Asteroid belt was **not** formed from a single planet that exploded.

Sample used:

9 (6 pts) Neptune's moon Triton is smaller than the Earth's Moon. However, Triton has a thin nitrogen atmosphere while the Moon has no atmosphere. Explain why this is.

10 (10 pts) Why might Triton, a world with a surface composed primarily of methane (CH_4) and ammonia (NH_3) ices remain geologically active longer than the Moon, a world with a surface composed primarily of rock? (Assume that Triton was never subject to tidal heating and that its sunlight-driven volcanoes are unimportant).

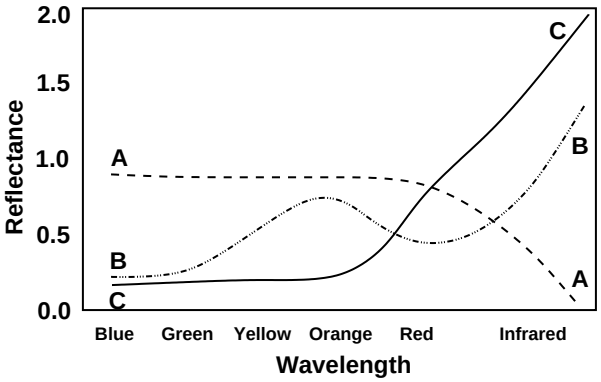
Not all of the worlds we have seen so far have been completely covered by impact craters. For each of the worlds below describe the physical process(es) (2pts) and materials (2 pts) that destroy impact craters.

11 (4 pts) Earth

12 (4 pts) Io

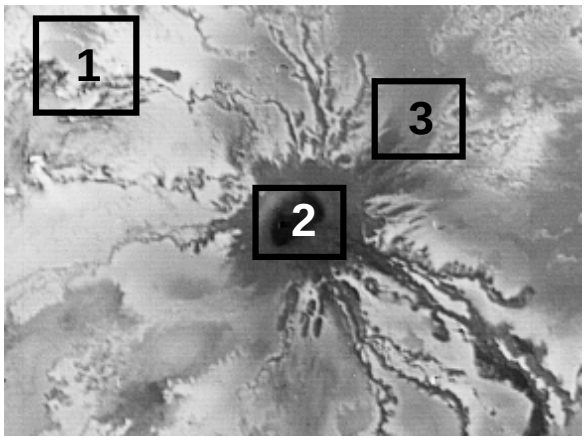
13 (4 pts) Europa

14 (5 pts) The gravitation force of the Sun on the Earth is about 176 times the gravitational force of the Moon on the Earth. However, the Moon has a greater influence on the tides on the Earth. Explain why this is.



On the left is the reflectance spectra of three different regions on the surface of Jupiter's moon Io. The spectra were taken in an area around a volcanic caldera. Use these spectra to answer the questions on this page.

15 (6 pts) Describe the colors of the three regions if you were to observe them **visually**.



16 (3 pts) To the left is an image of the area where the three spectra were taken. For each of the three numbered regions place the letter of the spectra that was taken in that region. Since this is a black and white image you will have to rely on clues other than visual color.

Region #1 _____

Region #2 _____

Region #3 _____

17 (6 pts) Justify why you matched the spectra to the regions in the question above.