ASTRONOMY 150 – MIDTERM Name: _____

February 4, 2010 – Winter 2010 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 (3 pts) Which of the following characteristics of the Moon is the best evidence that the Moon has been extensively heated?

(a) Mass of the moon
(b) Moon orbit inclination
(c) Lack of volatiles
(d) Lack of iron core
(e) Oxygen isotopes like the Earth

2 (3 pts) Which of the following features on Mars is most likely to have an age of about 3.8 billion years?

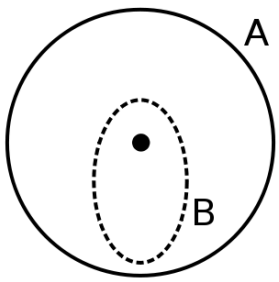
(a) The Hellas giant impact basin
(b) The Tharsis shield volcanic region
(c) The landing site of Viking I on the Northern Plains
(d) The South Pole CO_2 ice
(e) The salt-rich rocks at the Opportunity site

3 (3 pts) The distance between the Earth and Moon is increasing. This leads to

(a) A shorter day on the Earth
(b) A longer day on the Earth
(c) A increase of the tilt of the Earth's axis
(d) A decrease of the tilt of the Earth's axis

4 (3 pts) The impact of a 10km asteroid on the Earth is especially deadly due to

(a) The large shock wave sent through the interior of the Earth
(b) The melting of materials at the impact site
(c) The fact that it makes dinosaurs particularly angry
(d) The interaction of the ejected material and the Earth's atmosphere
(e) The ejected material buried large land masses

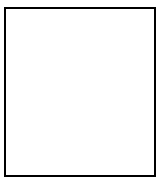


5 (3 pts) The image on the left shows two different orbits. Compared to orbit **A** (solid line), the orbit **B** (dashed line) has a ...

(a) shorter period and a larger variation in orbital speed
(b) longer period and a larger variation in orbital speed
(c) shorter period and a smaller variation in orbital speed
(d) longer period and a smaller variation in orbital speed

6 (8 pts) Impact breccia is very common on the Moon's surface. Explain how this type of rock was formed and describe the source of energy that was used in its formation.

7 (8 pts) Would you expect a world with a surface made of water ice to have a similar secondary atmosphere as a world with a surface made of rock? Why or Why not?



8 (8 pts) Explain why the Apollo lunar samples are key to determining the age of the surface of Mercury.

9 (8 pts) Explain why rocks found on the rims of impact craters are generally older than rocks found farther away.

10 (8 pts) Volcanoes on Venus released a lot of water into the early atmosphere of Venus. There is no water in the current atmosphere of Venus. Explain what happened to the water in Venus' atmosphere.

11 (3 pts) When did most of the surface of the Moon we see today actually form? Be specific.

12 (3 pts) When did most of the surface of Venus we see today actually form? Be specific.

13 (6 pts) Explain why your **weight** would change if you increased the size of the Earth, without changing the mass of you or the Earth. Would your weight increase or decrease?

14 (2 pts) What is the density of a world that is composed mostly of rock with a little iron mixed in?

15 (3 pts) Describe how the Moment-of-Inertia factor of a world changes as it differentiates.

16 (8 pts) Explain why it is unlikely that a Moon-sized world, 0.5 AU from the Sun, would have an atmosphere.

17 (8 pts) Describe (in words) the relative number of different sized craters on a typical mare surface on the Moon.

18 (10 pts) In the space below, sketch a possible phase diagram for a substance with the following characteristics:

1. It is solid at room temperature and room pressure.
2. It is liquid when the temperature and pressure are each **twice** what they are in this room.
3. It is gaseous when the temperature and pressure are **one half** what they are in this room.
4. Make sure to label your axes!