ASTRONOMY 150 – MIDTERM Name: _____

November 5, 2009 – Autumn 2009 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) Larger worlds are geologically active for a longer time than smaller worlds since larger worlds ...

(a) have more radioactive elements and lose heat faster
(b) have more radioactive elements and lose heat slower
(c) have fewer radioactive elements and lose heat faster
(d) have fewer radioactive elements and lose heat slower

2 (3 pts) Every Apollo mission to the Moon explored simple impact craters craters since ...

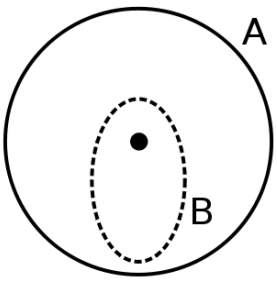
(a) It is easier to land by simple impact craters.
(b) Impacts bring deep-seated materials to the surface
(c) Simple impact craters tend to collect meteorites.
(d) Simple impact craters shield the astronauts from the Sun.
(e) No real reason, they are just very common on the Moon.

3 (3 pts) Unlike the Moon, the Earth does not have a surface covered by impact-generated regolith. The **main** reason for this is that the Earth ...

(a) is a bigger target
(b) has an atmosphere
(c) is more geologically active
(d) rotates faster
(e) has a higher gravity

4 (3 pts) The tallest mountains on Mars are **higher** than the tallest mountains on the Earth. The **main** reason for this is that the Earth ...

(a) is a bigger target
(b) has an atmosphere
(c) is more geologically active
(d) rotates faster
(e) has a higher gravity



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) smaller semi-major axis and smaller eccentricity
(b) smaller semi-major axis and larger eccentricity
(c) larger semi-major axis and smaller eccentricity
(d) larger semi-major axis and larger eccentricity

6 (8 pts) How does the age of a typical volcanic surface on the Moon compare with the age of the volcanic Tharsis region on Mars? Make sure you give specific numbers for your ages, not just "younger" or "older."

7 (8 pts) Explain how the age of the volcanic Tharsis region on Mars is determined.

8 (8 pts) Explain why we think, based on data from the Mars Rovers, that the atmosphere of Mars was thicker in the past .

9 (8 pts) Explain why the geological activity on all worlds in the inner solar system decreases over time.

10 (8 pts) The surface of Venus receives no infrared radiation from the Sun, yet the surface radiates a large amount of infrared radiation into its atmosphere. Explain how this can be.

11 (8 pts) The amount of CO_2 and O_2 in the Earth's atmosphere has changed over time. Explain in what way the amounts have changed and why. Make sure you address both the CO_2 and O_2.

12 (8 pts) Explain why we believe that **all** impact basins in the inner solar system have about the same age of about 3.8 billion years old.

13 (8 pts) Describe **two** ways that the Earth-Moon system is unusual compared to other worlds in our solar system.

The table on the right shows the data for two worlds orbiting a star exactly like our Sun, each at the **same distance** of 0.4 AU from the star. Assume both of these worlds have been around for 4.5 billion years. Use these data to answer the questions on this page.

Planet	Mass [Earth = 1]	Size [Earth = 1]
Caprica	1/8	1/2
Tauron	6	2

14 (8 pts) Compare the gravity of these two worlds. [Be quantitative; show your work.]

15 (3 pts) Which of the two worlds would you expect to be more geologically active? Explain your answer.

16 (8 pts) Which of the two worlds is most likely to have an atmosphere? Explain your answer. [Hint: Look at your answers above.]