Name: \_\_\_\_\_

April 28, 2011 – Spring 2011

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 (2 pts) The eccentricity of an elliptical orbit can also be thought of as the:

- (a) speed of the orbit
- (b) change in gravity of the orbit
- (c) amount of "flatness" of the orbit
- (d) average distance of the orbit

**2** (2 pts) A greenhouse gas is very good at absorbing \_\_\_\_\_ light.

- (a) x-ray
- (b) ultraviolet
- (c) visible
- (d) infrared
- (e) radio

 $\mathbf{3}$  (2 pts) Lunar Regolith was formed when:

- (a) The original crust of the Moon cooled
- (b) The surface of the Moon was shattered and melted by an impact
- (c) The surface of the Moon melted and flowed across the Moon
- (d) The surface of the Moon was impacted into a powder

4 (2 pts) A world with a density of 3.6  $g/cm^3$  would be composed of:

- (a) completely rock
- (b) mostly rock with a little iron
- (c) about half rock and half iron
- (d) mostly iron with a little rock
- (e) completely iron

**5** (2 pts) Which of the following worlds would be **least** likely to have produced a sample of basalt with an age of 0.5 Byrs.

- (a) The Moon
- (b) Earth
- (c) Mars
- (d) Venus

6 (8 pts) Explain how we know the Moon was geologically active 3.6 billion years ago.

7 (8 pts) Explain why the Moon is no longer geologically active today.

8 (2 pts) The most common gas in the atmosphere of the Earth is \_\_\_\_\_

You have discovered a new planet orbiting the Sun at a distance of 1.3 AU. This planet is twice the size of the Earth, and is four times as massive. The planet is composed of mostly rock and has **no** life on its surface.

**9** (6 pts) How does the **gravity** of this planet compare to the Earth's gravity? [Be quantitative; show your work.]

10 (4 pts) Would you expect the amount of current **geological activity** on this world to be greater or less than the geological activity of the present day Earth? Explain your answer.

11 (4 pts) Would you expect this world to have an atmosphere currently? Explain your answer.

12 (4 pts) How would the surface temperature on this world compare to the Earth's? Be careful, really look at your answers above.

13 (5 pts) Explain why the current surface of Venus has no very small (<< 1 km) impact craters.

14 (5 pts) Explain why the current surface of Venus has no large (> 500 km) impact basins.

15 (6 pts) The Chicxulub impact crater in the Yucatan Peninsula is about 180 km in diameter. The Earth's crust in this area is about 10 km thick. Did the Chicxulub impact dig below the Earth's crust? Explain your answer.

16 (2 pts) The most common gas in the atmosphere of Venus is \_\_\_\_\_

17 (8 pts) Explain why volatile elements are rare on the Moon.

 ${\bf 18}$  (8 pts) Describe two pieces of evidence that suggest Mars had liquid water on its surface at some time in its history.

**19** (2 pts) The most common gas in the atmosphere of **Mars** is \_\_\_\_\_

For each of the following surfaces, tell me: (1) the most likely rock type found on the surface, (2) the most probable age of the surface (I want a number with units), (3) How the age of the surface was determined, and (4) what processes are modifying the surface TODAY.



20 (8 pts) Mars - Olympus Mons Volcano

Sample Type: \_\_\_\_\_

Surface Age: \_\_\_\_\_

How surface age was determined:

Processes modifying surface today:



 $\mathbf{21}~(8~\mathrm{pts})$  Moon - Farside highland surface

Sample Type: \_\_\_\_\_

Surface Age: \_\_\_\_\_

How surface age was determined:

Processes modifying surface today:

