

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

ERTH 1 – Planets  
Instructor – Memorie Yasuda  
Assigned – May 18, 2007  
Due – May 25, 2007

## Homework 5 – Mars, Mercury, Space junk (100 points total)

- Answers must be typed, double-spaced, and printed. Exceptions: equations and hand-drawn illustrations.
- All papers must be stapled together. Name on front with initials at top right-hand side of each page.
- You will need to use the following resources as you see fit:
  1. Resources on the Web (you may want to look at the posted websites for ideas first, although you will need to look beyond that)
  2. Your textbook and any other printed materials you want to use.
  3. Notes
- You are encouraged to confer with other students, but individual answers must be original, i.e. crafted and written by individuals. No credit will be given for unusually similar responses.
- Homework is due at the start of class. No late work accepted.

### A. Short answer (30 points)

1. Is Valle Marineris on Mars a tectonic or erosional feature in origin?
2. Is most of the evidence for running water on Mars recent or relatively old?
3. Is there water on Mars? If so, where has it been seen?
4. Has Olympus Mons been seen erupting?
5. How long is the solar day on Mercury (in Earth days)?
6. How long is the sidereal day on Mercury (in Earth days)?
7. What is ratio of spin:orbit for Mercury (in Earth days)?
8. Which material is the most primitive – comets, carbonaceous chondrites, or irons?
9. Where are meteorites easier to find – Hawaii, Mexico or Antarctica?
10. Which area of Mars has the higher elevation – north or south?

### B. Essay questions

1. **The polar ice caps** on Mars are relatively easy to see. Because cycles of ice growth and retreat are in sync with Martian seasons, these observations have fueled questions about the prospect of life on Mars - where there is water, there being the possibility of life. **(30 points)**

With modern technologies, the existence of water on Mars has been confirmed, although much of the ice is actually frozen carbon dioxide, rather than frozen water.

Answer the following questions related to the polar ice caps.

- a. How cold does it get at each pole on Mars? Refer to your text (page 289-291) and the following website:

<http://tes.asu.edu/monitoringmars/index.html>

The two movies that show the range of daytime and nighttime surface temperature variations may be useful.

- b. At the surface pressure of the Martian surface, at what temperatures will each of the following gases freeze?

1. Carbon dioxide
2. Water

- c. Are the polar temperatures always cold enough for both carbon dioxide and water to stay frozen? Consider the answers you gave in **Part a** and **Part b** of this question.

The permanent ice caps on Mars are not identical. The permanent north polar cap is “much larger than that in the south” and it is made up water, unlike the permanent ice cap in the south.

- d. Which polar area has a hotter summer – north or south?
- e. Does the pole with the cooler summer have a larger permanent ice cap during summer? Was this expected based on your answer to **Part d**?
- f. You would think that the pole with the cooler temperatures would be the one to retain frozen carbon dioxide. Instead the permanent ice cap in the hemisphere with the cooler summer pole is missing this ice component. Explain why this might happen.

**2. Why are the largest volcanoes on Earth much smaller than on Mars? (8 points)**

- 3. Discuss potential differences between the seasons on Mars vs. Earth.** Write a brief summary of less than 100 words. Highlight the most significant differences. Use the following website as a starting point: **(8 points)**

<http://science.nasa.gov/headlines/y2000/interplanetaryseasons.html>

**4. Orbital debris (8 points)**

Use the following websites as a starting point for information:

<http://orbitaldebris.jsc.nasa.gov/index.html>

<http://orbitaldebris.jsc.nasa.gov/faqs.html>

- a. What is orbital debris? Does it include rocks?

- b. How fast do pieces of orbital debris move?
- c. Do most pieces of orbital debris move faster or slower than a speeding bullet? Explain briefly.
- d. What are the potential problems associated with orbital debris?

**5. Where are the Mars Rovers, Spirit and Opportunity, now? (8 points)**

Use the following websites as a starting point for information:

<http://sse.jpl.nasa.gov/index.cfm>

**For another cool website to check out just for fun:**

<http://www.google.com/mars/>

**6. Why might the landscapes of the desert southwest and Mars look somewhat similar? Explain your thinking. (8 points)**