

Name: _____

ERTH 1 – Planets
Instructor – Memorie Yasuda
Assigned – April 25, 2007
Due – May 4, 2007

Homework 3 – The Moon (100 points total)

- Answers must be typed, double-spaced, and printed, except 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 end of class. No late work accepted.

A. Weathering, mass wasting, and erosion (40 points)

Although you may have heard about three major categories of rocks – igneous, metamorphic and sedimentary – and the transformation of one rock type into another according to the rock cycle – most of the rocks that make up the Earth are igneous in origin when you consider the entire volume of the Earth and not just the rocks near its surface.

Rock that solidifies from a cooling magma is solid. Loose materials are only found very near the Earth's surface. Smaller pieces of rock are generally formed by breaking apart or dissolving preexisting solid rock, either physically or chemically. (Sedimentary rocks are formed by reassembling these pieces – by cementing them together or precipitating dissolved materials back into solids.)

The terms weathering, mass wasting, and erosion are all related to the formation or transport of loose rocks near the surface of a planet. We have seen several features of the Moon that are the result of the processes described by these terms.

a. Define each of these terms – mass wasting, weathering and erosion. (25 points)

Make sure that your definitions make clear distinctions between the three different processes. These terms refer to separate processes on the Earth's surface, although they can occur concurrently. Consider several different explanations before formulating your own definition.

b. Indicate which of the three processes were involved in forming the following features of the Moon. Explain why you selected a given process. (15 points)

1. **Lunar regolith** (lunar soil)
2. **Stepped sides of a complex impact crater** (slumped blocks on the side)
(see <http://www.lpi.usra.edu/expmoon/science/craterstructure.html>)
3. **Broken rock produced by rapid temperature change during the transition from night-to-day**

(see moonquakes -
http://science.nasa.gov/headlines/y2006/15mar_moonquakes.htm)

c. Where is erosion more important - on the surface of the Earth or Moon?

B. The value and future of the Moon. (60 points)

Read the following articles and use them as a springboard to other resources.

Space Science Nations race to tap moon resources

<http://www.asahi.com/english/Herald-asahi/TKY200704200093.html>

Mining the Moon

by Harrison Schmitt, former Apollo astronaut

<http://www.searchanddiscovery.net/documents/2004/schmitt/images/schmitt.pdf>

Answer the following questions with short or brief essay answers. Be concise and cover key points you wish to make.

1. What are people interested in mining on the Moon? (5 points)
(This material is trapped in the lower mantle, but rare on the surface of the Earth because melting temperatures cause it to be released from rock, enter the atmosphere and then escape into outer space.)
2. Why might this material be more abundant on the surface of the Moon than the Earth? Present a hypothesis and explain the logic behind your idea. (20 points)
3. Explain why some people think that access to this material is important to people on Earth. You may want to add key points that were not mentioned in the articles. (15 points)
4. Who seems to own the Moon? (10 points)
5. When was the last time that humans set foot on the Moon? (5 points)
http://www.nasa.gov/mission_pages/apollo/index.html
6. What is the name of the next U.S. Moon program? (5 points)