

Science

Honors Project

MP 4: "New Planet's Core"

DUE: June 4, 2013



Overview of Project: *A new planet has just been discovered! It revolved around a "nearby" star, just outside our solar system. An unmanned space probe was sent to bring back rock core samples* from the new planet. You, as a geologist, have the special assignment of examining the rock core sample and developing a geological timeline that tells the history of your newly discovered planet.*

Considerations:

1. The honors project extends what we are learning in class by exploring beyond Sedimentary rocks to learn about and understand how Metamorphic and Igneous rocks are formed. Also you will be recreating a geological timeline based on your observations, just as we do in class with the Grand Canyon using Principles of Geology.
2. The honors project is completely independent of school (there will be little to no time given in class to complete it).
3. Don't procrastinate! It takes time and effort to submit a project that is worthy of "honors" distinction.
4. Complete all work on your own. It is permissible to ask questions, but not to have someone do your work for you.

New Planet's Core

A new planet has just been discovered! It revolved around a “nearby” star, just outside our solar system. An unmanned space probe was sent to bring back rock core samples* from the new planet. You, as a geologist, have the special assignment of examining the rock core sample and developing a geological timeline that tells the history of your newly discovered planet.

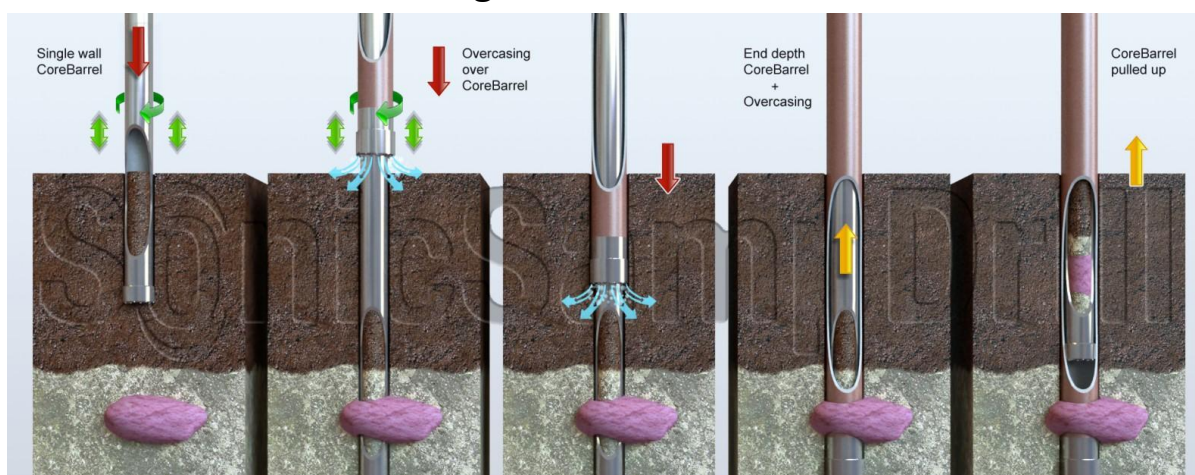
You are expected to apply the geological principles you have learned to identify the rocks and fossils and draw conclusions. Consider the Law of Superposition and Principle of Horizontality when observing the core sample. Be prepared to defend your interpretation of the geological history of your planet.

*Geologists can drill deep down into the surface of a planet and pull up a tube containing all the rock layers beneath the crust. The sample inside the tube is called a “core sample” and it shows the order of the rock layers below. Geologists use these rock layers to infer how the planet evolved over time and what environmental changes might have occurred.



**An Actual
Core Sample**

Drilling for a CORE SAMPLE



To be turned in:

- ✓ Print out of WebQuest “Test Your Skills” Results
- ✓ Identification of Rock Layers Worksheet
- ✓ Geological Timeline
- ✓ Planet’s Factual History: Story or Geological Report

****Make sure
your name and
period are on your
project****

Part One: WebQuest

Before you can identify the rock layers found in the core sample, you must first learn about the three types of rocks. Go to the following WebQuest: <http://www.learner.org/interactives/rockcycle/index.html> Follow the WebQuest through every page and interact with all of the activities. Be sure to use the attached worksheet when reading to help organize your thoughts and take notes. At the end of the WebQuest there is a fifteen question, multiple choice, test. Complete the test and print out the “Rock Cycle Assessment Test Results” page when **you must score at least a 73% (11 out of 15 questions)**. That means you may need to take the test several times before printing the results of a “passing” grade! Next, you will use the information you learned in the WebQuest and infer what types of rocks each layer contains in the core sample.

Part Two: Identifying Rock Layers in the Core Sample

Look at the core sample. Using the observations and evidence, **identify which type of rock each layer is made of**: Metamorphic, Igneous, or Sedimentary. For the Sedimentary rocks, go a step further and identify the rock name: Sandstone, Limestone, or Shale. **Fill in the rock type and environment information on the “Identification of Rock Layers” worksheet**. Examples of the environments are: Beach, Desert, Swamp, Ocean, Volcano, Heat and Pressure towards the center of the Earth, etc. In addition to turning in the worksheet, you will use it to guide your geological timeline.

Part Three: Geological Timeline of the New Planet

Once geologists know what types of rocks are in the core sample, they can use the geological principles such as the Law of Superposition and Principle of Horizontality to create a timeline of the planet’s history. **You will create a timeline, by hand or electronically, showing the history of your new planet. Your timeline should show the rock layers in the order that they were deposited and what type of rock existed during each time period.**

Consider the following:

- Which rock layers came first? Which rock layers are most recent?
- What does the width of the layer tell you?
- Are the rock layers horizontal or did something happen to cause a shift in that layer?

Visit these websites to create a timeline online:

<http://timerime.com/>

<http://www.timetoast.com/>

<http://www.preceden.com/>

Part Four: Planet’s Factual History

Use the timeline to create a document describing the geological history of the new planet. **You can either write the history as a story OR a factual, geological report (pick one)**. You are describing your timeline in narrative form, including how the environment has changed over time and the evidence that led to your interpretation of the core sample (rock types). **Your history must include:**

- What type of rock is in each layer (in order that it was deposited)
- Describe what environment formed each type of rock and how long it took (relative to other layers)
- What *evidence* led you to the identification of the rock (support your claim)

Be sure to look at the rubric before turning it in to ensure that all the parts (4) are completed correctly.

****Make sure your name and period are on your project****

****All four parts must be turned together to be graded****

Grading Rubric:

	0	1	2
Test Your Skills WebQuest Assessment	Student did not turn in the assessment results.	Assessment was printed out and turned in, but students did not “pass” test (score at least 11 out of 15 points).	Assessment was printed out and turned in. Student scored at least 11 out of 15 on the test (73%).
Identification of Rock Layers	Student completed Identification of Rock Layers worksheet and there are 4 or more errors.	Student completed Identification of Rock Layers worksheet and there are 2-3 errors.	Student completed Identification of Rock Layers worksheet and there are 1 or less errors.
Timeline	Timeline was not in the order that the rocks were deposited OR did not include the rock types OR was not turned in.	Timeline was in the order that the rocks were deposited, included the rock types but did not differentiate the amount of time for each layer.	Timeline was in the order that the rocks were deposited, included the rock types, and differentiated the amount of time for each layer.
Factual History of Planet	Factual history of planet included only ONE of the three criteria OR was not turned in. Criteria: (1) how the environments changed over time in the order that the rocks were deposited, (2) evidence used to ID rock layers, and (3) environments are accurate.	Factual history of planet described how the environments changed over time in the order that the rocks were deposited but may not have included the evidence used to identify the rock layers OR the environments of the rock layers contained errors.	Factual history of planet (1) described how the environments changed over time in the order that the rocks were deposited AND (2) included the evidence used to identify the rock layers. (3) The environments are accurate to the type of each rock.
Factual History of Planet: Spelling and Grammar	There are more than two errors in the capitalization of sentences AND/OR ending punctuation AND/OR spelling.	There are 1-2 errors in the capitalization of sentences AND/OR ending punctuation AND/OR spelling.	All sentences are capitalized and have ending punctuations. There are NO spelling errors.

Total Score: _____ out of 10 points

Extra Credit Points Possible:

Total Rubric Score	Extra Credit Points (added to Final MP 4 Average)
10	3
9-7	2
6-4	1
3-0	0

Rock Cycle WebQuest Guide

Go to <http://www.learner.org/interactives/rockcycle/index.html>. Read and answer the following questions (or fill in the blanks). Be sure to watch all animations. There is a TEST at the end of the WebQuest (you MUST score at least 11 out of 15 points to pass).

Type of Rocks

Rock characteristics include: crystals, ribbon-like layers, glassy surface, gas bubbles, sand or pebbles, and fossils.

1. What are some characteristics of sedimentary rocks?

2. What are some characteristics of metamorphic rocks?

3. What are some characteristics of igneous rocks?

4. Name 2 examples of each type of rock (names of rocks in your collection):

Sedimentary: _____

Metamorphic: _____

Igneous: _____

WebQuest Guide continued...

How Rocks Change

5. Heat and pressure result in this kind of rock _____.

6. Melting of rocks forms (the stuff in the Mantle of the Earth)

_____.

7. Rocks melt at what temperature range?

8. When a volcano erupts, magma comes out and hardens is an example of this process: _____.

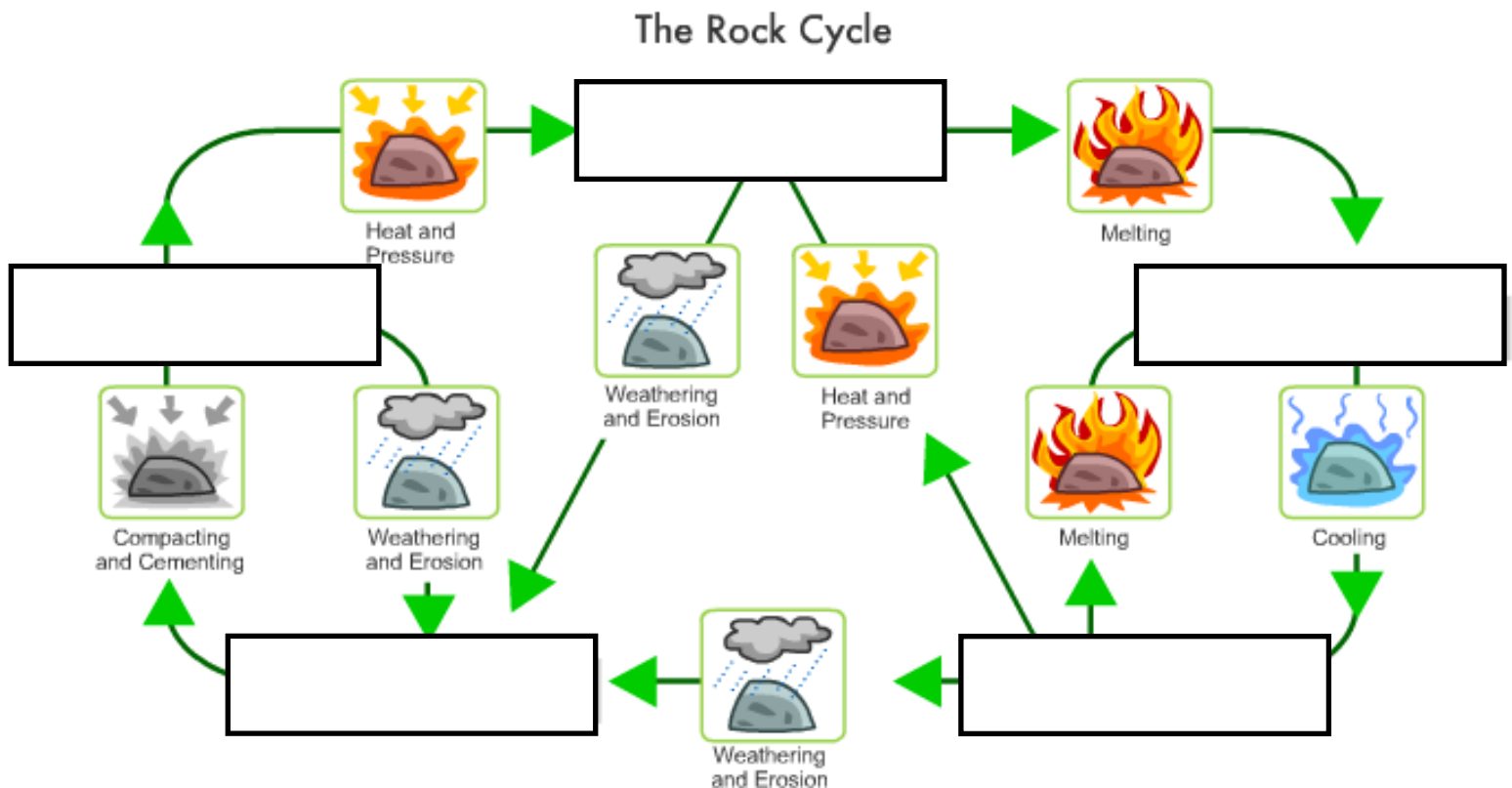
9. The slow cooling of magma under the Earth's surface forms (intrusive or extrusive) igneous rocks? _____

10. Weathering and erosion breaks and moves pieces of rocks called

_____.

11. Compaction and cementation result in this kind of rock

_____.



Core Sample from New Planet

Observations/Evidence



Layer 1: Layer is tan in color. Surface of rock is gritty and individual sand grains are visible.

Layer 2: Layer is dark grey/black in color. Surface is smooth and composed of clay and silt particles. Imprints of fern leaves are visible.

Layer 3: Layer is orange/red in color. Surface of rock is gritty and individual sand grains are visible. Sand grains are uniformly small and well rounded. Fossils of reptile or insect tracks are noted.

Layer 4: Layer's smooth surface is shiny, like glass, and black in color.

Layer 5: Layer is tan in color. Surface of rock is gritty and individual sand grains are visible.

Layer 6: Layer is white in color and is made of sand and clay. Imprints of fossilized shells are evident. Rock fizzes when in contact with HCL acid.

Layer 7: Layer contains wavy stripes of white and black color. Small, flat surfaces that are shiny or sparkly are evident.

Identification of Rock Layers

Turn this Worksheet in

Name: _____

Date: _____ Period: _____

Core Sample from New Planet

Rock Type and Environment



Layer 1: Type of Rock is _____
Environment: _____

Layer 2: Type of Rock is _____
Environment: _____

Layer 3: Type of Rock is _____
Environment: _____

Layer 4: Type of Rock is _____
Environment: _____

Layer 5: Type of Rock is _____
Environment: _____

Layer 6: Type of Rock is _____
Environment: _____

Layer 6: Type of Rock is _____
Environment: _____