



Earth Exploration Pre-visit

Classroom Activities

Brief Synopsis

Students will read descriptions of the earth's layers on a handout to decipher the difference between the layers and then label their titles on a cross-section of the earth. Then students will visit an interactive website to learn about plate tectonics. They can take a self quiz to help them utilize the vocabulary they just learned on the site, or for a greater challenge, the teacher may print out a quiz from the web page and use it as a more traditional test.

Ages: Designed for 5th–8th grade

Time Considerations: About 1 hour (15 minutes for the worksheet and 45 minutes for website exploration and quiz)

Materials:

- Worksheets
- Pencils
- Computer access to the internet

Vocabulary:

Asthenosphere, Convergent, Crust, Divergent, Fold, Gondwanaland, Laurasia, Lava, Magma, Mantle, Pangaea, Subduction zone, Supercontinent, Plate Tectonics, Transform

Outcomes:

1. Students will demonstrate the differences between the earth's layers,
2. Students will connect the action of the earth's layers to the theory of Plate Tectonics.
3. Students will understand how the layers of the earth and plate tectonics have changed the surface of the earth.

Minnesota Academic Standards:

Science: 8.III.A.1&5, 9-12.III.A.4-7

Social Studies: 4-8.B.3

Language Arts: 4.I.A.1&2, 4.I.B.1&2, 4.I.C.1, 5.I.A.1&2, 5.I.B.1, 5.I.C.1, 6.I.A.1-3, 6.I.B.4, 7.I.A.1-3, 7.I.B.1&5

Revised Mar 2007

Set-up

During the Earth Exploration class at Eagle Bluff, your students will be learning about how basic geological principles have shaped and continue to shape our planet. To help your students begin to understand some of these basics, you will need to photocopy the attached **worksheet**, one for each student, **pencils** for each student, and **computer access to the internet**.

Activity 1: Layers of the Earth

Background: Geologists have long been studying our earth to try to answer the many questions about how our earth formed and why it looks the way it does today. Some of the things that are important to understand when studying geology, is the structure of the earth's layers and how these layers impact the surface of the earth where we live.

Each layer of the earth is made out of slightly different materials and may be solid, liquid (molten) or semi-solid, like clay. Each of these layers therefore behaves in a different way, impacting each other and ultimately shaping the surface of the earth known as the crust.

Procedures:

1. Hand out the *Layers of the Earth* worksheet to each student.
2. Have students read through the descriptions of each of the earth's layers, to see if they can label the cross-section of the earth picture correctly. Filling out this worksheet will be like solving a puzzle. Students will have to fill it out with a pencil in case they need to change their answers as they work through it.
3. Once your students have had enough time, correct the worksheet together, to make certain all students understand the layers correctly.
4. Next, have your students log into the following web page:

<http://www.enchantedlearning.com/subjects/astronomy/planets/earth/Continents.shtml>

5. Once on this page, they should scroll down and read about plate tectonics and plate movement.
6. At the end of the page have them select [An interactive quiz about plate tectonics](#), to help them use the vocabulary they just learned. This is a self grading test, so students will know if they answer the questions correctly as they answer them.
7. For a greater challenge, print out [A quiz about continental drift and plate tectonics](#) for them to take as a written quiz. This is a quiz you will have to collect and correct yourself, but offers greater challenge for your students and their understanding of plate tectonics and the vocabulary.
8. Use the vocabulary your students have learned from these activities as



a part of class discussions. Can your students:

- List the names of the layers of the earth?
- Describe the basic idea of plate tectonics in their own words?
- Explain the difference between diverging, converging and transforming plate boundaries through creating a drawing?
- Name at least one form of evidence that supports the theory of plate tectonics?

Activity 2: Geology and Humans

Background: Most geologic processes are very slow and often go unnoticed by people. However, there are many areas in our own country and around the world that have been dramatically impacted by sudden geologic events.

Procedures:

1. Divide students into groups of 3 or more.
2. Give each group a topic from the list below or any other appropriate example of an area where geological events affect a human population.
 - San Andreas Fault - San Francisco, California, USA
 - Mount Rainer - Seattle, Washington, USA
 - Mount Loa - Loa, Hawaii, USA
 - Mount St. Helens - Washington, USA
 - Kilauea - Volcano in Hawaii, near Kalapana
 - Mt Pelee - Martinique, West Indies
 - Yellowstone Volcano - Yellowstone National Park, Wyoming, USA
 - Kobe Earthquake Zone - Hanshin, Japan
 - Seismic Zone 180 km from Bogota, Columbia
 - San Andreas Fault - Los Angeles, California, USA
 - Seismic Zone near Izmit, 130km from Istanbul - Turkey
 - Seismic Zone - Mexico City, Mexico
 - Stromboli - Aeolian Islands, Italy
3. Instruct students to research how the geology affects the lives of those that live in the area. Have them report on the following things:
 - Assess the geology of the area. What geological process caused this? How was it formed and what type of geological formation caused the event?
 - Describe the ecology of the area. What plants and animals inhabit the land? How do humans use the land in the area? Are there cities, towns, industrial areas, tourist spots, farms etc?
 - Look at the culture of the people and their lifestyles. Has geology affected their cultures and traditions? How is this shown in their daily lives?
 - Assess previous geological events. How frequent are these events? When did they occur in the past? Describe what happened when the events occurred - the effect on both the land, people, infrastructure, and the environment. Look also at how man tried to predict and prevent such an event.
 - Now look to the future. Are such events likely in the future and what steps are being taken to try to limit the destruction caused?

Teacher Tips

- Preview the website to make sure the connection is working with your school's computers and to prepare you for introducing the vocabulary you want your students to focus on.
- Correct the worksheet together to make sure students understand the layers of the earth correctly before they move on to the website.
- If you chose to assign the Extension Activity, you could have it be a formal report, a poster project, or oral presentation. Use this geologic topic to further your students' skills in writing, designing, or oral reporting.



Additional Resources

<http://library.thinkquest.org/17457/english.html>

Kid oriented website to learn about plate tectonics, continental drift, and Pangaea, etc.

<http://www.enchantedlearning.com/subjects/astronomy/planets/earth/Continents.shtml>

A great website geared towards kids to learn about continental drift and the layers of the earth. Includes a link to a quiz about these things after they have read the information

<http://csep10.phys.utk.edu/astr161/lect/earth/tectonics.html>

Website for slightly older students to learn about plate tectonics, etc.

<http://pubs.usgs.gov/publications/text/inside.html>

Layers of the earth from USGS

<http://www.cotf.edu/ete/modules/mse/e/earthsysflr/plates1.html>

Descriptions of plate tectonics and the different plate boundaries. Includes nice cross-section illustrations of the different boundaries.

Worksheet: Layers of the Earth

Read the descriptions below and fill in the labels for each layer of the earth.

Hint: Fill out the Three Major Layers first before trying to fill in the Detailed Layers of the Earth.

The **Lower Mantle** is semi-rigid and is the deepest part of the mantle, just above the core.

The **Upper Mantle** is rigid and is the uppermost part of the mantle and along with the crust makes up the Lithosphere.

The **Crust**, one of the major layers, is the outer most layer of the earth which makes up less than 1% of the Earth's mass (0.4%) The crust is covered by continents and ocean floor. The continents are about 35 km thick and the ocean floors are about 7 km thick.

The middle major layer is called the **Mantle** and is about 2900 km thick. It makes up about 70% of the Earth's mass (68.1%). It has two distinct layers to it.

The **Inner Core** of the earth is 1270 km thick and is solid.

The **Outer Core** of the earth is 2200 km thick and is liquid.

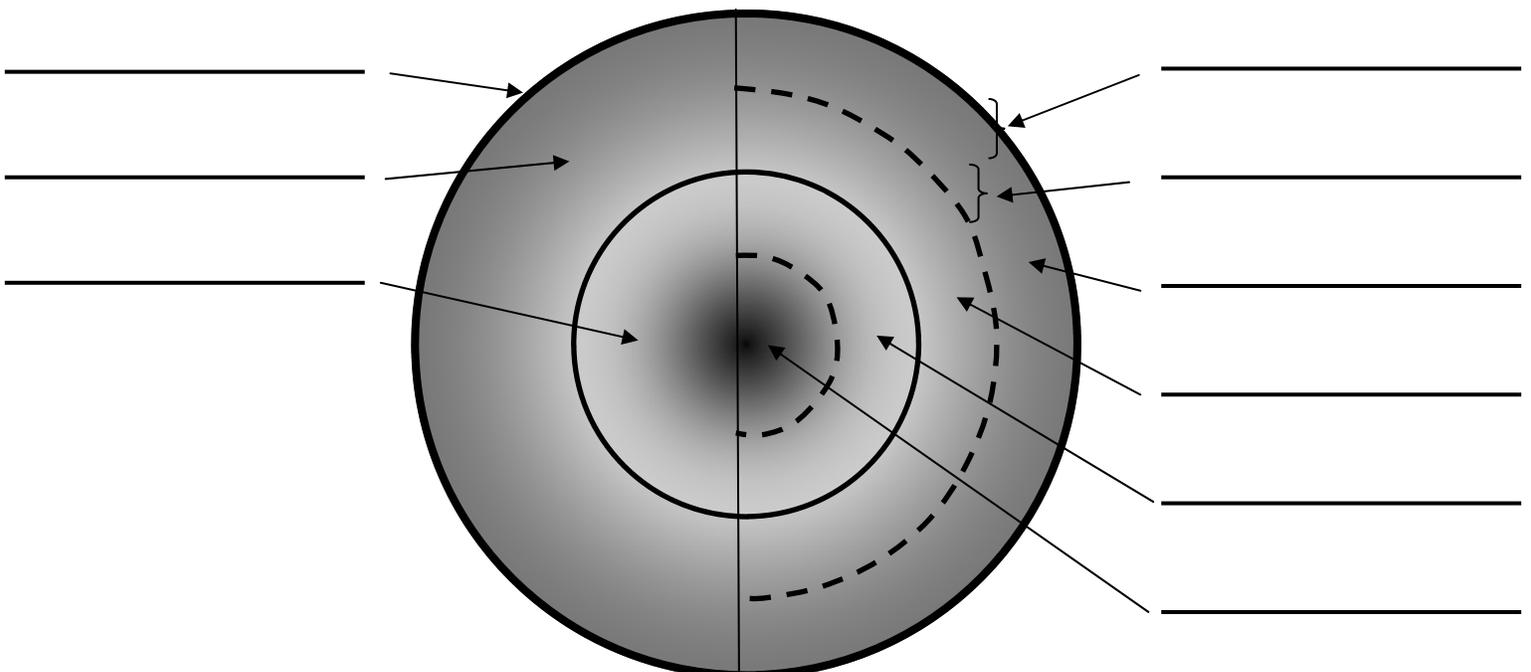
The **Lithosphere** is actually made up of the crust and the upper part of the upper mantle.

The major layer at the center of the earth is called the **Core** and is mainly made of iron and nickel and makes up about 30% of the Earth's mass (31.5%). It has two distinct layers to it.

The **Asthenosphere** is the lower part of the upper mantle that exhibits plastic (flowing properties). It is located below the lithosphere.

The Three Major Layers of the Earth

Detailed Layers of the Earth



Answer Sheet: Layers of the Earth

Read the descriptions below and fill in the labels for each layer of the earth.

Hint: Fill out the Three Major Layers first before trying to fill in the Detailed Layers of the Earth.

The **Lower Mantle** is semi-rigid and is the deepest part of the mantle, just above the core.

The **Upper Mantle** is rigid and is the uppermost part of the mantle and along with the crust makes up the Lithosphere.

The **Crust**, one of the major layers, is the outer most layer of the earth which makes up less than 1% of the Earth's mass (0.4%) The crust is covered by continents and ocean floor. The continents are about 35 km thick and the ocean floors are about 7 km thick.

The middle major layer is called the **Mantle** and is about 2900 km thick. It makes up about 70% of the Earth's mass (68.1%). It has two distinct layers to it.

The **Inner Core** of the earth is 1270 km thick and is solid.

The **Outer Core** of the earth is 2200 km thick and is liquid.

The **Lithosphere** is actually made up of the crust and the upper part of the upper mantle.

The major layer at the center of the earth is called the **Core** and is mainly made of iron and nickel and makes up about 30% of the Earth's mass (31.5%). It has two distinct layers to it.

The **Asthenosphere** is the lower part of the upper mantle that exhibits plastic (flowing properties). It is located below the lithosphere.

The Three Major Layers of the Earth

Detailed Layers of the Earth

