



4th - 8th Grade

4-H PROJECT

LESSON

PLANS:

4-H Helps

YOUTH

into the

21st Century

Series **1**

"Earth Works"

LSU
AgCenter
Research & Extension

Dear Project Helper,

This lesson is part of an effort by the 4-H Youth Development Division of the LSU AgCenter to provide teaching activities that are fun as well as educational. We are pleased you have agreed to work with youth as they learn and grow. You will help them learn scientific concepts that they will use for many years.

The lessons address Louisiana Content Standards science benchmarks; therefore, what you do with this activity should help strengthen students for LEAP testing. We appreciate your being part of this effort.



Learning Activity: "Earth Works"



Key Concepts:

1. The Earth has three main layers – the crust, the mantle, and the core.
2. The three layers of the Earth can be compared to the layers of a boiled egg.

How can members apply this information?

1. Identify the three main layers of the Earth.
2. Describe the composition of the Earth's crust.
3. Describe plate tectonics.
4. Identify continents and oceans.
5. Teach what they have learned to others.

Getting Ready:

1. Gather all supplies needed.
2. Read lesson and be thoroughly prepared.
3. Boil one egg for each group of six participants.
4. Make a copy of the "Puzzling Plates" puzzle (Resource Sheet B, p. 111) for each group. Cut the pieces apart and place them in small bags, one puzzle for each group.
5. Prepare a large poster of the "Cross Section of the Earth" (Resource Sheet B, p. 109). It helps to have the layers shown in different colors.

Track:
Earth science

Life Skills:
Teaching other new skills,
problem solving and
decision making

Character Focus:
Responsibility

Project Skill:
Processing information,
thinking critically

Louisiana Content
Standards
Benchmarks:
ESS-E-A1, ESS-M-A1,
ESS-M-A2

Delivery Mode:
4-H Club Meetings, Science Class
and School Enrichment

Time Allotted:
20-30 minutes

*Number of
Participants:*
10-30

What You Need for the Lesson:

1. One boiled egg for each group of six participants
2. A plastic knife for each group
3. A set of the "Puzzling Plates" pieces for each group (Resource Sheet B)
4. Large poster of the "Cross Section of the Earth" (Resource Sheet A)

4th-8th Grade "Earth Works"

What You Say:	What You Show or Do:	What Participants Do:
<p>How many layers exist in our Earth?</p> <p>The Earth is divided into three chemical layers: the core, the mantle and the crust. The core is composed of mostly iron and nickel and remains very hot, even after 4.5 billion years of cooling. The core is divided into two layers: a solid inner core and a liquid outer core. The middle layer, the mantle, is made of minerals rich in the elements iron, magnesium, silicon and oxygen. The crust is rich in the elements oxygen and silicon, and has less aluminum, iron, magnesium, calcium, potassium and sodium. There are two types of crust. Basalt is the most common rock on Earth. Oceanic crust is made of relatively dense rock called basalt. Continental crust is made of lower density rocks, such as andesite and granite.</p> <p>What is plate tectonics?</p> <p>Plate tectonics is a relatively new theory that has revolutionized the way geologists think about the Earth. According to the theory, the surface of the Earth is broken into large plates. The size and position of these plates change over time. The edges of these plates, where they move against each other, are sites of intense geologic activity, such as earthquakes, volcanoes and mountain building.</p> <p>The Earth's surface is covered by a series of crustal plates.</p> <p>Convection currents beneath the plates move the crustal plates in different directions.</p>	<p>Allow time for discussion and responses.</p> <p>Display the "Cross Section of the Earth" poster for the participants.</p> <p>Allow students time to recall what the three layers of the Earth are; this tests the students' prior knowledge and exposure to the subject matter.</p>	<p>Discuss and respond.</p>

4th-8th Grade “Earth Works”

What You Say:	What You Show or Do:	What Participants Do:
<p>The source of heat driving the convection currents is radioactivity deep in the Earth's mantle.</p> <p>The ocean floors are continually moving, spreading from the center, sinking at the edges and being regenerated by these movements.</p>		
<p>(Experience) Today we will work in groups of six to discover how a boiled egg and the layers of the Earth's crust are alike. You will cut the egg in half and use the egg as a model to identify the Earth's crust.</p>	<p>Divide participants into groups of six. Demonstrate each step. Distribute a boiled egg and a plastic knife to each group.</p> <p>Allow time for each group to do the activity and parallel the layers of the Earth and the layers in the boiled egg</p>	<p>Follow directions and identify each layer of the egg as it corresponds to the layers of the Earth.</p>
<p>(Share) What part of the Earth's crust did each layer of the boiled egg represent? (Possible answer: Cracked shell represents the Earth's crust, called plates; the egg white represents the mantle, and the yolk represents the Earth's core.)</p>	<p>Allow for discussion and response.</p>	<p>Discuss and respond.</p> <p>Put puzzle together.</p>
<p>Now that we understand the layers of the Earth, let's look closer at its crust—also known as “plate.” The Earth's crust, unlike the egg's shell, is not one solid piece. It is divided into several large plates and many smaller ones. I will give each group a bag with pieces of a puzzle that will, when put together, show all the many different layers of the Earth's crust.</p>	<p>Distribute the puzzle pieces to members and give them an allotted amount of time to put the puzzle pieces together.</p>	
<p>As you discovered as you put the pieces of the puzzle together, the Earth's crust is made of many different plates. Some plates are mainly continents, and</p>	<p>Show on the puzzle where continents and oceans are located and where the boundaries fall within the continents and oceans. (<i>You may want to have a</i></p>	<p>Identify continents and oceans. Also observe that plates are made of both continents and oceans.</p>

4th-8th Grade "Earth Works"

What You Say:	What You Show or Do:	What Participants Do:
<p>others are mostly water. Two are completely water.</p>	<p><i>world map large enough to point to continents and oceans.)</i></p>	
<p>These plates are not stable. They move over time.</p>	<p>Introduce terms. As you pull two plates (pieces of the puzzle) apart, explain that this is <i>divergence</i>. Ask participants to do this with pieces of their puzzle to understand the term more completely. Push two plates together and explain that this is <i>convergence</i>. Ask participants to do this with pieces of their puzzle to understand the term.</p> <p>Move two plates so that one moves up and one moves down and explain that this is <i>transformation</i>. Ask participants to do this with pieces of their puzzle to understand the term.</p>	<p>Follow directions and move plates as instructed to understand the terms: <i>divergence</i>, <i>convergence</i> and <i>transformation</i>.</p>
<p>(Process) Why is it important to learn about the Earth's layers and plate tectonics? (Possible answer: to understand how the moving of plates affects our environment.) What was the most interesting part of today's activities? (Answers will vary)</p>	<p>Allow for discussion and response.</p>	<p>Discuss and respond</p>
<p>(Generalize) Is it easier for you to describe things with words or with pictures?</p>	<p>Allow for discussion and response.</p>	<p>Discuss and respond</p>
<p>(Apply) How can you help someone you know learn something by using pictures and/or hands-on examples to teach them? (Possible answers: Do a demonstration from my 4-H project to show what I have learned, help someone learn how to solve math problems by using diagram or pictures,</p>	<p>Allow for discussion and response.</p>	<p>Discuss and respond.</p>

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What You Say:	What You Show or Do:	What Participants Do:
<p>include and design hands-on activities (such as using a hard-boiled egg to represent the Earth) to help others understand a particular concept or idea, etc.)</p>		
<p>Be responsible. Take time to understand something before trying to explain it to someone else. Remember that it is our responsibility to explore facts before coming to a conclusion about any new concept or idea. Interviewing people with knowledge of the concept or idea you are investigating will allow you to make responsible and informed decisions. In addition, by being responsible, you are pursuing excellence and that will help you to complete any task.</p>		

Ways to Help Members Learn More:

1. Investigate how volcanoes are formed
2. Study earthquakes
3. Study the theory of continental drift
4. Explore on the Internet:
<http://www.ucmp.berkeley.edu/geology/tectonics.html>
<http://www.seismo.unr.edu/ftp/pub/louie/class/100/plate-tectonics.html>

Resources:

Plate Tectonics, by Phillis Jane Robinson, Mt. Vernon Etc., Chicago

The New View of the Earth by Seiya Uyeda, 1978 by W.H. Freeman and Co.

The Earth's Dynamic Systems by W. Kenneth Hamblin, 1975 by Burgess Publishing Co.

Global Tectonics by Philip Kearey & Frederick J. Vine, 1996 by Blackwell Sciences Ltd.

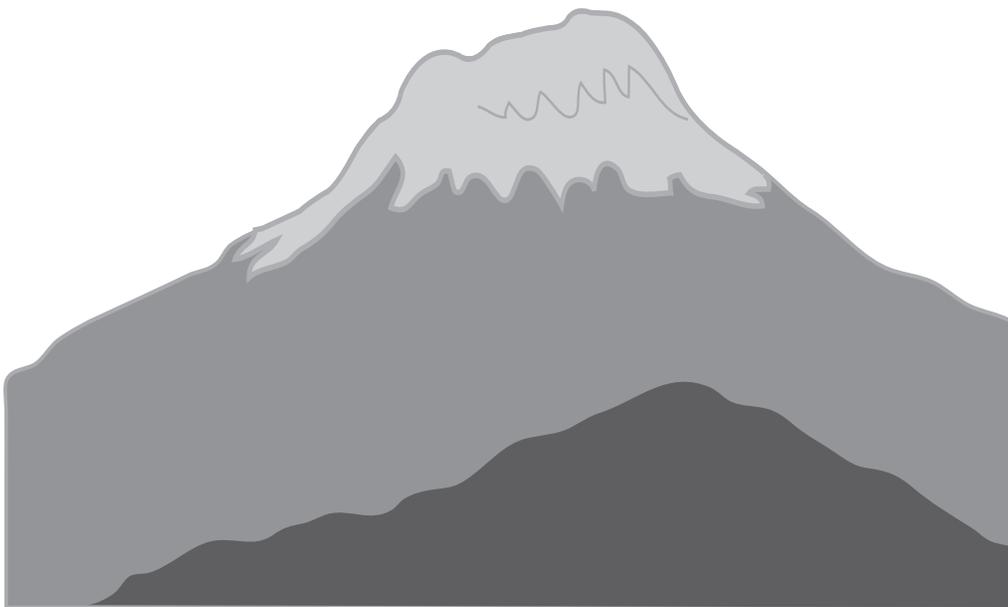
Physical Geology by Carla W. Montgomery, 1987 by Wm. C. Brown Publishers
Louisiana Content Standards, published by Louisiana State Department of Education

Authors:

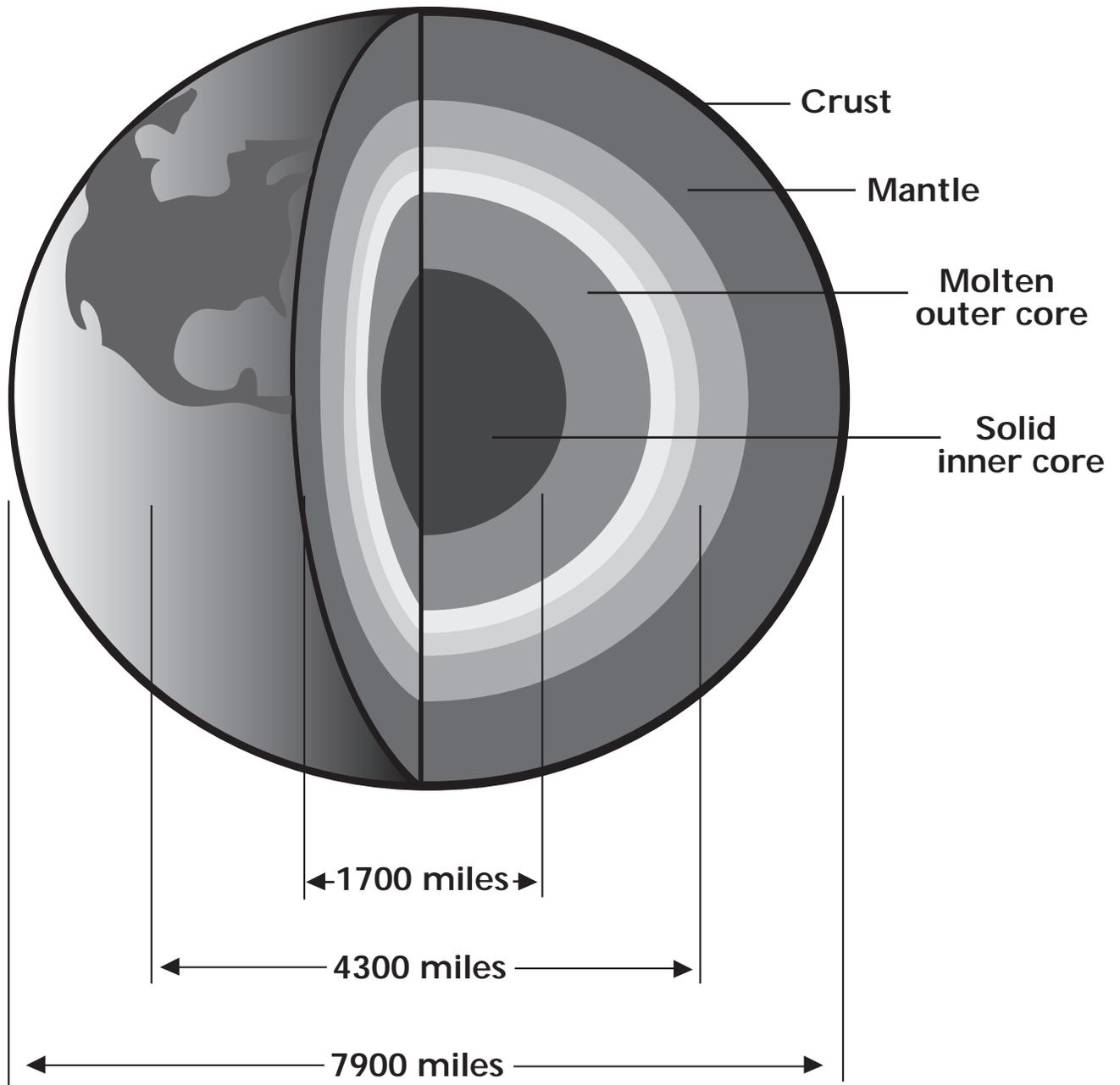
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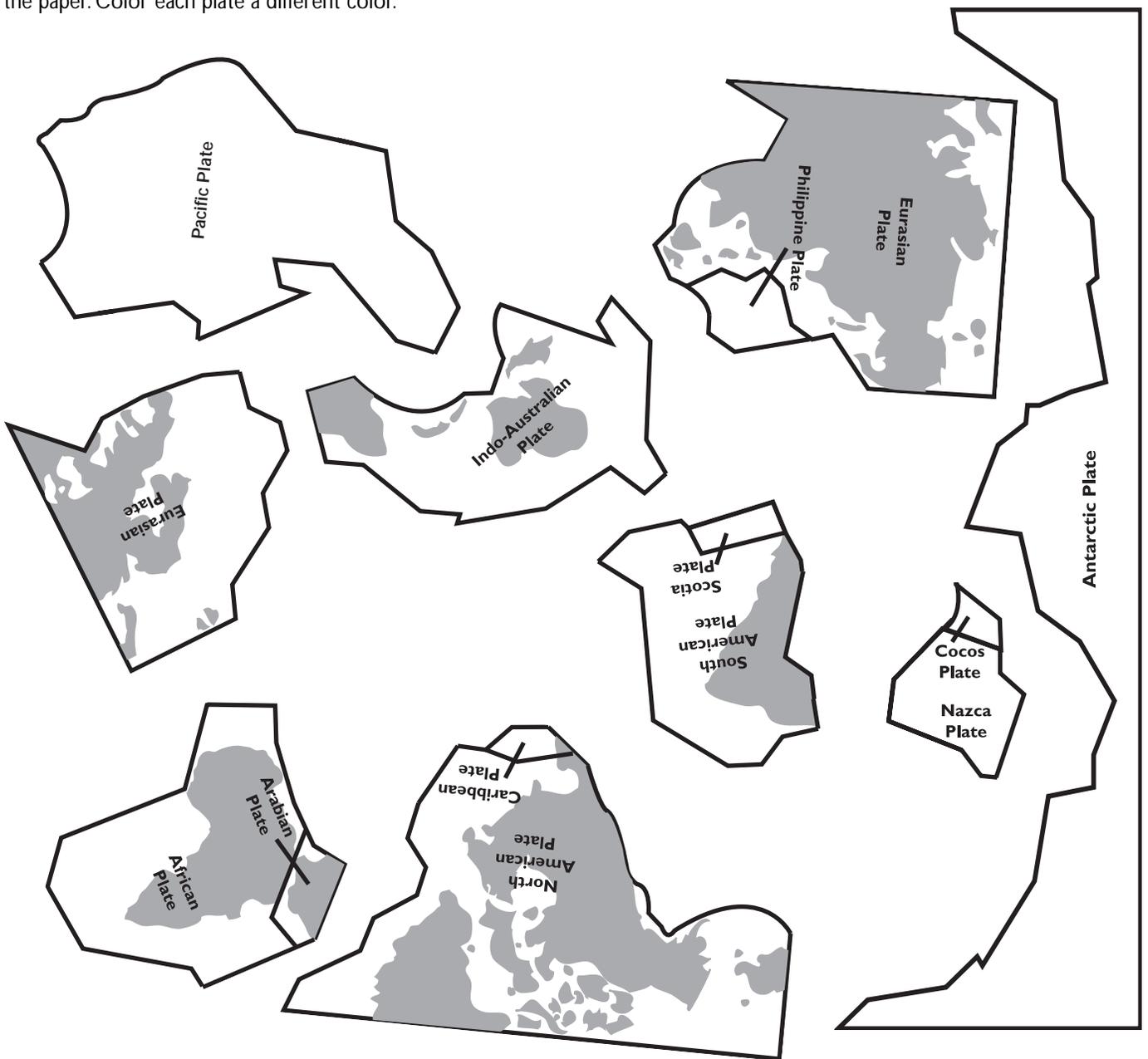
Cross Section of the Earth



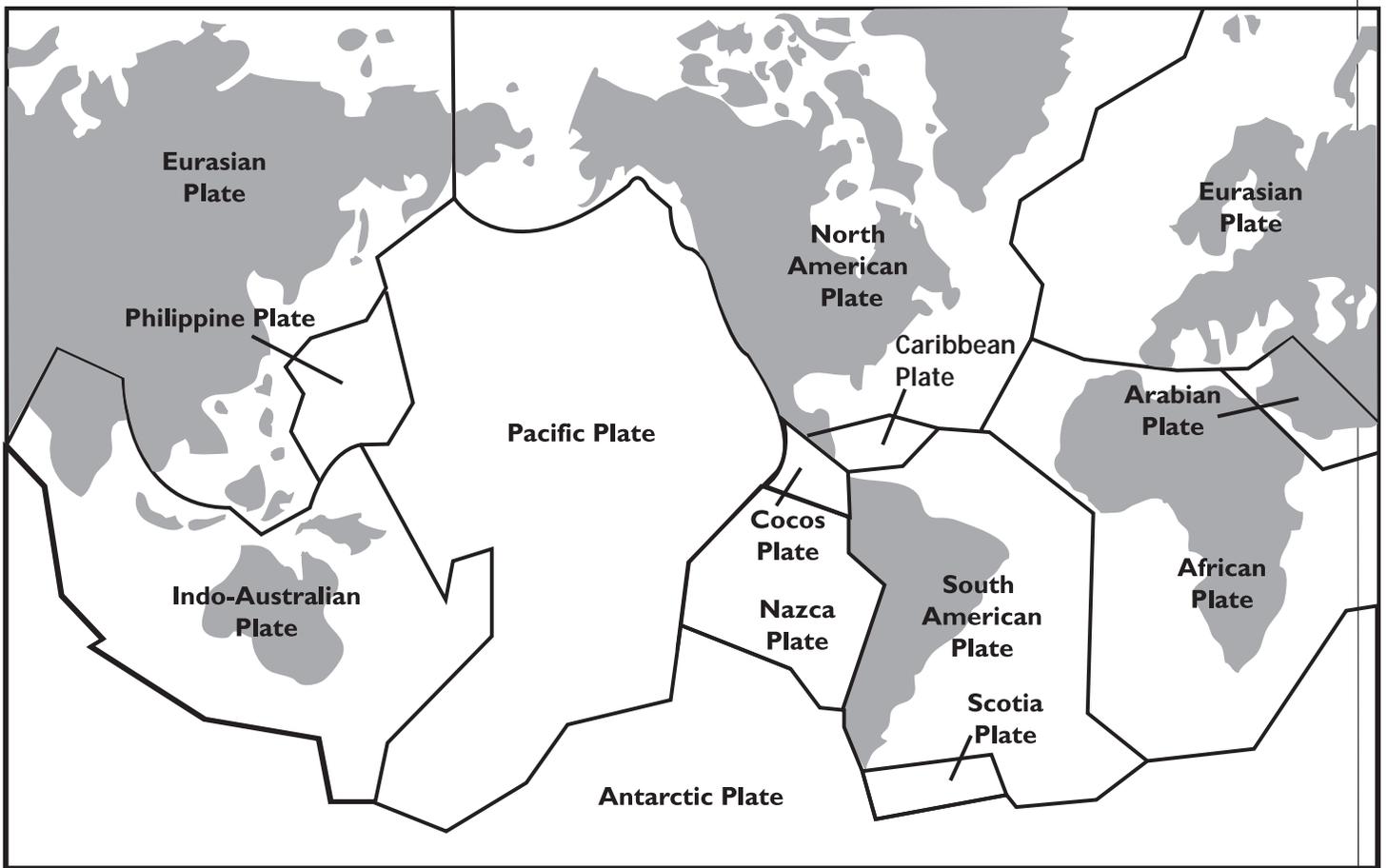
Puzzling Plates

The puzzle pieces below show the *tectonic plates*. Geologists think that the crust and upper layer of the mantle are not one sheet of solid rock. Instead it is divided into about 12 enormous plates and many smaller ones. These plates “float” like icebergs on the top of the asthenosphere.

Directions: Cut out the nine pieces and place them on a sheet of construction paper, making a rectangular map of the earth. **Hint:** Begin by placing the Pacific Plate in the center of your paper. When you have fit the pieces together correctly, glue them to the paper. Color each plate a different color.



Puzzle Key



Visit our Web site: www.lsuagcenter.com

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