

The following instructional plan is part of a GaDOE collection of Unit Frameworks, Performance Tasks, examples of Student Work, and Teacher Commentary. Many more GaDOE approved instructional plans are available by using the Search Standards feature located on [GeorgiaStandards.Org](http://GeorgiaStandards.Org).

## Georgia Performance Standards Framework

### **Unit One Organizer: The Changing Earth: Constructive and Destructive Forces** **(4 ½ weeks)**

**OVERVIEW:** In this unit, students will become famous explorers! They will travel around the world to create a documentary television series that educates their audience about our ever changing Earth. They will go where glaciers are found, on to the Ring of Fire, next to the San Andreas Fault, and finally down to the ocean floor. In their documentary series, they will explain what constructive and destructive forces are at work, how those forces impact the environment, and how humans have used technology in attempts to control the constructive and destructive processes. Students will video their documentaries and broadcast them to other students.

#### **STANDARDS ADDRESSED IN THIS UNIT**

##### **Focus Standards:**

##### **Earth Science**

##### **S5E1. Students will identify surface features of the Earth caused by constructive and destructive processes.**

- a. Identify surface features caused by constructive processes.
  - Deposition (Deltas, sand dunes, etc.)
  - Earthquakes
  - Volcanoes
  - Faults
- b. Identify and find examples of surface features caused by destructive processes.
  - Erosion (water --- rivers and oceans, wind)
  - Weathering
  - Impact of organisms
  - Earthquake
  - Volcano
- c. Relate the role of technology and human intervention in the control of constructive and destructive processes. Examples include but are not limited to
  - Seismological studies,
  - Flood control, (dams, levees, storm drain management, etc.)
  - Beach reclamation (Georgia coastal islands)

**STANDARDS ADDRESSED IN THIS UNIT**

**Supporting Standards:**

**Habits of the Mind**

S5CS4. Students will use ideas of system, model, change, and scale in exploring scientific and technological matters.

S5CS5. Students will communicate scientific ideas and activities clearly.

S5CS6. Students will question scientific claims and arguments effectively.

ELA5R1. The student demonstrates comprehension and shows evidence of a warranted and responsible explanation of a variety of literary and informational texts. The texts are of the quality and complexity illustrated by the Grade Five reading list.

d. Relates a literary work to information about its setting.

ELA5W1. The student produces writing that establishes an appropriate organizational structure, sets a context and engages the reader, maintains a coherent focus throughout, and signals a satisfying closure.

ELA5W3. The student uses research and technology to support writing.

ELA5LSV2. The student listens to and views various forms of text and media in order to gather and share information, persuade others, and express and understand ideas.

**LITERATURE SELECTIONS**

Source of Recommendation	Title	Author	ISBN
NSTA	Erosion	Sherie Winner	1-57505-223-7
NSTA	Forces of Nature: The Awesome Power of Volcanoes, Earthquakes, and Tornadoes	Catherine O'Neill Grace	0-7922-6328-6
NSTA	Earthquakes	Sally M. Walker	0-87614-888-7
NSTA	Jacques Cousteau	Leslie A. DuTemple	0-8225-4979-4

**ENDURING UNDERSTANDINGS**

- The Earth is constantly changing.
- The Earth's landforms were created through constructive processes, destructive processes, or a combination of both.
- Human interaction can harness some of Earth's natural processes, even if only temporarily.

<b>ESSENTIAL QUESTIONS:</b>	
<ul style="list-style-type: none"> <li>• How can a force of nature that is so far away possibly affect me in Georgia?</li> <li>• How can a force be both destructive and constructive at the same time?</li> <li>• What causes earthquakes to occur?</li> <li>• If we could use a wet vac to get all of the water out of the ocean, what would it look like?</li> </ul>	
<b>MISCONCEPTIONS</b>	<b>PROPER CONCEPTIONS</b>
<ul style="list-style-type: none"> <li>• The Earth has always looked exactly the way it looks now and it always will.</li> <li>• Glaciers are huge sheets of ice that are permanent.</li> <li>• Volcanoes are found only in Hawaii.</li> <li>• Earthquakes only happen in California.</li> <li>• The ocean floor is completely flat.</li> </ul>	<ul style="list-style-type: none"> <li>• Earth started with one supercontinent, Pangaea. Through plate tectonics the land has moved to where it is now, and it continues to move.</li> <li>• Glaciers are constantly moving and melting.</li> <li>• Volcanoes are found in many places around the world, but most are concentrated in the Pacific area known as The Ring of Fire.</li> <li>• Earthquakes can happen anywhere two plates are next to each other.</li> <li>• The ocean floor has features such as mountains, and valleys just like we see on land.</li> </ul>

CONCEPTS:	KNOW AND DO	LANGUAGE	EVIDENCE OF LEARNING
Constructive and Destructive forces result in many of the surface features seen on Earth.	Identify and find surface features caused by constructive and destructive forces.	Deposition, Earthquakes, Volcanoes, Faults, Erosion, Weathering	Glacier Model Task
Some forces are both constructive and destructive at the same time.	Volcanoes can create new land masses while destroying a volcanic mountain or the surrounding area.	Volcanoes, eruption, lava, Ring of Fire	Volcano model task and journal entries
Earthquakes can change the surface of the Earth.	Demonstrate that the surface the Earth can change when plates move causing an earthquake.	Earthquake, Plates, Seismological Studies	Earth's plates task, observations and discussions

## GRASP

**Culminating Activity:** GRASPS activity

### GRASPS

**Goal:** You as a famous explorer have been commissioned by the National Geographic Channel to produce a documentary series titled, Our Ever Changing Earth.

**Role:** Yourself as a famous explorer.

**Audience:** National Geographic Channel viewers.

**Scenario:** You travel around the world to educate your viewers about the Earth and how it is always changing through plate tectonics, constructive and destructive processes, and how things are impacted by these changes. First stop: Iceland. This part of the series will focus on glaciers; how they came to be, and what happens when they move and melt. Part two of the series will take us to The Ring of Fire! You will explain how volcanoes start to form and what happens when they continue to erupt. Next stop: Somewhere along the San Andreas fault. Teach your viewers exactly what causes an earthquake, and what scientists do to measure the sizes of earthquakes. Your final destination will be to the ocean. You will show and describe to your viewers what the ocean floor looks like, and how tides, waves, and currents affect the land.

**Product:** A documentary series titled, Our Ever Changing Earth.

### TASK

Lesson Title: Slip Slidin' Away!

Essential Question: How can a force of nature that is so far away possibly affect me in Georgia?

Teacher Instructions: After reading Erosion, the students will make models of glaciers to see for themselves how glaciers can shape Earth's surface. Students will line the bottom of an aluminum pie pan with gravel to represent Earth's crust. They will fill the pie pan with water and put it in the freezer. Once the model of the glacier is frozen, students will carefully remove it from the pie dish and place it on a piece of poster board to which the students have affixed small pieces of gravel and sticks to represent trees. The students will then apply pressure to the model of the glacier so that it begins to slide. They will notice that the mass of the glacier when paired with its movement, causes the ground underneath it to tear up and trees to fall. Students should place a second model of a glacier on a flat piece of poster board that is being supported on both ends, but not in the middle and just leave it. Place an empty pie dish under the center of the poster that is not being supported to catch water. Once the model of the glacier melts, they will notice that there is a hole in the poster where the glacier was, and the water is in the pie dish. This will show how glacial lakes are formed. This activity works best outside on a warm, sunny day so that students quickly reach the understanding that outside weather conditions greatly impact glaciers.

Assessment: activity sheet

Enrichment/Extension/Homework: Global warming and the melting of the polar ice cap is a worldwide concern. Write a letter to one of our senators/representatives at the national level with a proposal as to what may be done to harness some of the destructive processes that are caused by this phenomenon.

### TASK

Lesson Title: Lava, Lava, Everywhere!

Essential Question: How can a force be both destructive and constructive at the same time?

Teacher Instructions: Read the section of the book, Forces of Nature: The Awesome Power of Volcanoes, Earthquakes, and Tornadoes that focuses on volcanoes. After viewing the photographs taken of the Montserrat eruption, and reading about what caused this event, lead a group discussion about how volcanic eruptions impact and affect Earth and the people who are immediately affected by these eruptions. Students will be able to understand how a volcanic eruption is a destructive force, but ask them if can think of how it might be constructive as well. Lead a discussion about the formation of the Hawaiian Islands. Have students research the newest island of the Hawaiian Islands that is forming presently. Once students have an understanding of volcanoes and how they erupt, have them make a model of a volcano in a box lid. Students will use play sand, sterilized soil, and water to form a "mountain" around a tall plastic cup. Students will measure the height of their volcano as well as the circumference around the base of the volcano and record their measurements on their activity sheet. Inside the cup, have students mix a half box of baking soda, a tablespoon of dishwashing liquid, and about 10-12 drops of red food dye. Pour enough vinegar

(try one or two measuring cups) into the cup to watch the “lava” run down the mountain! Have students record their observations. Allow the “lava” to dry over night. The next day, have the students measure and record the height and circumference of their volcanoes and record their measurements on their activity sheet. Have them note any differences between the measurements they took yesterday. Have them erupt their volcanoes and follow the same procedures for the next couple of days. Students will be able to see how constant eruptions of a volcano change the way the mountain looks as well as the land surrounding it.

Assessment: Students will keep a log/journal with written descriptions and measurements of changes in their volcanic model.

Enrichment/Extension/Homework: Students may write the following RAFT:

**Role:** Some of the more widely recognized Hawaiian Islands such as Maui, Honolulu, the big island Hawaii, etc.

**Audience:** Loihi, the newest Hawaiian island that is presently forming

**Format:** a friendly letter

**Topic:** Some advice for you, our newest sibling!

### TASK

Lesson Title: Shake, Rattle & Roll!

Essential Question: What causes earthquakes to occur?

Teacher Instructions: Teacher will divide the students into three groups for a jigsaw activity. Using the book, Earthquakes, by Sally M. Walker from the *Earth Watch* series, each group will research a different aspect of earthquakes and report their findings to the class. Group One will report on key terms in earthquake science. Group Two will report on basic concepts and causes of earthquakes, and Group Three will report on how scientists predict earthquakes as well as measure their intensity. Once all groups have reported, they can put their findings into action by making a model using cake!

Take two plain sheet cakes and allow students to decorate them with frosting and various candies so that they represent two of Earth’s plates. Encourage students’ creativity when decorating so that they not only make trees and buildings, but they specify the types of buildings they are constructing. (i.e. apartments, schools, shopping malls, power plants, water treatment facilities, etc.) Once decorated, have students slide the two cakes slowly past each other to create an “earthquake”! Allow students to discuss the results with each other. What happened to the Earth? What happened to the buildings? What would be a long range effect of this destruction? How does it affect the people living in the area? How does it affect plant and animal life?

Assessment: Have the students write the following RAFT after the cake activity and discussion.

**Role:** Associated Press journalist

**Audience:** newspaper readers

**Format:** newspaper article

**Topic:** Earthquake Strikes: Causes Mass Destruction!

Enrichment/Extension/Homework: As an Enrichment/Extension activity, students may research The Great 1906 San Francisco Earthquake and create a presentation for their classmates.

### TASK

Lesson Title: What I See Under the Sea!

Essential Question: If we could use a wet vac to get all of the water out of the ocean, what would it look like?

Teacher Instructions: Students and/or teacher will read the biography, Jacques Cousteau by Leslie A. DuTemple about the life of the famous underwater explorer and pioneer underwater filmmaker. Students will conduct their own research about the ocean floor and what shapes it. Students will then take what they have learned to write the following RAFT where they are a remote controlled submersible that is reporting to the oceanographer what it sees.

Assessment: Each student will write the following RAFT.

**Role:** A remote controlled underwater submersible

**Audience:** A famous underwater explorer who is controlling the submersible

**Format:** A dialogue

**Topic:** What I See Under the Sea!

RAFTs must include details about the following underwater features: continental shelf, continental slope, abyssal plain, mid-ocean ridge, trenches, volcanic islands, and seamounts. Students must also include a labeled diagram that they draw.

## TEACHER RESOURCES

### Additional Children's Literature:

Map: Satellite DK Publishing ISBN 978-0-756626419

Oceans Seymour Simon ISBN 0-06-088999-3

Diving to a Deep-Sea Volcano (Scientists in the Field) Kenneth Mallory ISBN 978-0-618-33205-2

Following the Coast Jim Arnosky ISBN 0-688-17118-4

Probing Volcanoes (Science on the Edge) Laurie Lindop ISBN 0-7613-2700-2

Dive! My Adventures in the DeepFrontier Sylvia A. Earle ISBN 0-7922-7144-0

The Children's Atlas of Natural Wonder Joyce Pope ISBN 1-56294-564-5

### Web Resources:

[www.seismo.unr.edu](http://www.seismo.unr.edu)

[www.usgs.gov](http://www.usgs.gov)

[www.noaa.gov](http://www.noaa.gov)

[www.usgs.gov](http://www.usgs.gov)