Georgia Performance Standards Framework for Earth Science – Grade 6

Unit: Water in Earth’s Processes
Differentiated (Tiered) Task
Mapping the Topography of the Ocean Floor

Standards (Content and Characteristics):

S6E3 Students will recognize the significant role of water in earth processes.
   c. Describe the composition, location, and subsurface topography of the world’s oceans.

S6CS1. Students will explore the importance of curiosity, honesty, openness, and skepticism in science and will exhibit these traits in their own efforts to understand how the world works.
   a. Understand the importance of—and keep—honest, clear, and accurate records in science.
   b. Understand that hypotheses are valuable if they lead to fruitful investigations, even if the hypotheses turn out not to be completely accurate descriptions.

S6CS2. Students will use standard safety practices for all classroom laboratory and field investigations.
   a. Follow correct procedures for use of scientific apparatus.
   b. Demonstrate appropriate techniques in all laboratory situations.
   c. Follow correct protocol for identifying and reporting safety problems and violations.

S6CS3. Students will use computation and estimation skills necessary for analyzing data and following scientific explanations.
   a. Analyze scientific data by using, interpreting, and comparing numbers in several equivalent forms, such as integers and decimals.
   b. Use metric input units (such as seconds, meters, or grams per milliliter) of scientific calculations to determine the proper unit for expressing the answer.
   c. Address the relationship between accuracy and precision and the importance of each.
   d. Draw conclusions based on analyzed data.

S6CS4. Students will use tools and instruments for observing, measuring, and manipulating equipment and materials in scientific activities.
   a. Use appropriate technology to store and retrieve scientific information in topical, alphabetical, numerical, and keyword files, and create simple files.
   b. Estimate the effect of making a change in one part of a system on the system as a whole.
c. Read analog and digital meters on instruments used to make direct measurements of length, volume, weight, elapsed time, rates, and temperature, and choose appropriate units for reporting various quantities.

**S6CS5. Students will use the ideas of system, model, change, and scale in exploring scientific and technological matters.**

a. Observe and explain how parts are related to other parts in systems such as weather systems, solar systems, and ocean systems including how the output from one part of a system (in the form of material, energy, or information) can become the input to other parts. (For example: El Nino’s effect on weather)

b. Identify several different models (such as physical replicas, pictures, and analogies) that could be used to represent the same thing, and evaluate their usefulness, taking into account such things as the model’s purpose and complexity.

**S6CS6. Students will communicate scientific ideas and activities clearly.**

b. Understand and describe how writing for scientific purposes is different than writing for literary purposes.

c. Organize scientific information using appropriate tables, charts, and graphs, and identify relationships they reveal.

**S6CS8. Students will investigate the characteristics of scientific knowledge and how it is achieved.**

Students will apply the following to scientific concepts:

a. When similar investigations give different results, the scientific challenge is to judge whether the differences are trivial or significant, which often requires further study. Even with similar results, scientists may wait until an investigation has been repeated many times before accepting the results as meaningful.

b. When new experimental results are inconsistent with an existing, well-established theory, scientists may require further experimentation to decide whether the results are flawed or the theory requires modification.

c. As prevailing theories are challenged by new information, scientific knowledge may change and grow.

**S6CS9. Students will investigate the features of the process of scientific inquiry.**

Students will apply the following to inquiry learning practices:

a. Scientific investigations are conducted for different reasons. They usually involve collecting evidence, reasoning, devising hypotheses, and formulating explanations.

b. Scientists often collaborate to design research. To prevent bias, scientists conduct independent studies of the same questions.

c. Accurate record keeping, data sharing, and replication of results are essential for maintaining an investigator’s credibility with other scientists and society.

d. Scientists use technology and mathematics to enhance the process of scientific inquiry.
### Georgia Performance Standards Framework for Earth Science – Grade 6

**S6CS10. Students will enhance reading in all curriculum areas by:**
- Reading in All Curriculum Areas
- c. Building vocabulary knowledge
- d. Establishing context

**Enduring Understanding:**
Describe the composition, location, and subsurface topography of the world’s oceans.

**Essential Question(s):**
How are the geological features that exist on land similar to the geological features on the ocean floor?

**Pre-Assessment:**
On individual white boards, have students sketch what they think the ocean floor looks like. Have students hold up the boards for a general assessment.

<table>
<thead>
<tr>
<th>Outcome/Performance Expectation</th>
<th>BASIC</th>
<th>INTERMEDIATE</th>
<th>ADVANCED</th>
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<tbody>
<tr>
<td>Students will map a small model of the ocean floor.</td>
<td>Students will map and graph the features of the ocean floor.</td>
<td>Students will map and graph the ocean floor profile and research the ocean floor between New Jersey and London.</td>
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**Performance Task:**
(Detailed Description)

**Teacher role?**
Teacher:
1. Show students a video explaining how we map the ocean floor. An example of a video is listed in the resource list.
2. Instruct groups of three students to make models of the ocean floor features using modeling clay.
3. Models should fit inside a shoebox.
4. Cut a piece of wire screen to fit the top of the box allowing about 0.5” extra on each side.

**Student role?**
Teacher: Same as the basic group.
Teacher: Same as the basic group.
| 5. Glue a strip of graph paper to one of the long sides of the screen and label x-axis in centimeters.  
6. Secure screen to the box using two rubber bands, one on each direction.  
7. Prepare a chart and graph worksheet on which students will record data.  
8. Give one box to each group making sure that students receive a different model than the one they made. Provide a 15-cm string and a permanent marker. | Students:  
1. Choose a place to drop your string through the screen until it touches the modeling clay. Be sure to stop lowering the string as soon as the string touches the model.  
2. Repeat this process at four other locations.  
3. Record your data on the chart.  
4. Graph the ocean floor using graph paper. | Student:  
1. Follow procedure for the basic group.  
2. Repeat the procedure to collect an unlimited number of points so that your floor profile is as accurate as it can be. (Teacher will need to remind students to develop some type of grid system. Suggestions include smaller wire and a piece of stiff wire as a probe or small grid graph paper placed over the top of the box and stiff wire used to poke through the boxes of the graph paper.)  
Student:  
1. Follow procedure for the intermediate group.  
2. Using electronic resources, research the ocean floor from New Jersey to London and make up an ocean floor profile using a multi-media presentation. |
### Georgia Performance Standards Framework for Earth Science – Grade 6

| | 3. Graph your points once again.  
| | 4. Compare your first graph with your second graph.  
| | 5. Write a conclusion paragraph summarizing the two procedures. |


| Homework/Extension | Write a letter to a friend explaining how you mapped the ocean floor. Sketch and color the ocean floor profile in the letter. | Write a letter to a friend explaining how you mapped the ocean floor. Sketch and color both ocean floor profiles and explain to your friend why one looks different than the other. | Write a story in which you are in an excursion from New Jersey to Europe. Describe the ocean floor features as you sail. |

| Instructional Tasks Accommodations for ELL Students | • Increase % of student talk about topic to help develop prior knowledge  
| | • Let ELL students label the phases of the moon, solar and lunar eclipses in their native language and present to class  
| | • Highlight key points of information students are to find  
| | • Extend the time students have for completing the assignment  
| | • Present model/example of work done well at beginning of the assignment |

| Instructional Tasks Accommodations for Students with Specific Disabilities | • Provide a peer partner for students with sensory disabilities  
| | • Use amplification equipment or communication aids as appropriate for students who are DHH  
| | • Have students with listening difficulties repeat the task instructions to an adult or a partner  
| | • Use proximity seating during direct instruction or when conveying content information prior to activity  
| | • Gain students’ attention before delivery of content information (ADD, ADHD) |

| Instructional Tasks Accommodations for Gifted Students | • Provide a learning center where students can be in charge of own learning  
| | • Ask student’s higher level questions that require them to investigate causes, experiences and facts to draw conclusions or make connections to other areas of learning |
| • Give gifted students opportunity to design multi-media game to use with the class |
| • Brainstorm with gifted students about types of projects they would like to explore for extending the classroom learning |
Table I. Ocean Depth at Different Points (Basic)

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<thead>
<tr>
<th>Points</th>
<th>Horizontal Distance (cm)</th>
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Table II. Ocean Depth at Different Points (Basic, Intermediate, Advanced)

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Example of the Ocean Floor Profile

Longest Box Dimension

Ocean Depth

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40