**Georgia Performance Standards Framework for Science – Grade 6**

| Unit Organizer: Water in Earth’s Processes  
| (Approximate Time: 5-6 Weeks) |

| OVERVIEW: This unit addresses the movement of water through the crust, ocean, and atmosphere. |

| STANDARDS ADDRESSED IN THIS UNIT |

**Focus Standards:**

**S6E3. Students will recognize the significant role of water in earth processes.**
- a. Explain that a large portion of the Earth’s surface is water, consisting of oceans, rivers, lakes, underground water, and ice.
- b. Relate various atmospheric conditions to stages of the water cycle.
- c. Describe the composition, location, and subsurface topography of the world’s oceans.
- d. Explain the causes of waves, currents, and tides.

**S6E6. Students will describe various sources of energy and with their uses and conservation.**
- a. Explain the role of the sun as the major source of energy and its relationship to wind and water energy.

**Supporting Standards:**

**S6E5. Students will investigate the scientific view of how the earth’s surface is formed.**
- f. Explain the effects of physical processes (plate tectonics, erosion, deposition, volcanic eruption, gravity) on geological features including oceans (composition, currents, and tides).
- j. Describe methods for conserving natural resources such as water, soil, and air.
ENDURING UNDERSTANDINGS

*Students will understand that:*

- The majority of the Earth's surface is covered with water.
- Most of the water on the Earth is salt water. Only a small amount is fresh water, including water in rivers, many lakes, underground water, and in the form of ice.
- The cycling of water in and out of the atmosphere plays an important role in determining climatic patterns.
- Water evaporation from the surface of the earth, rises and cools, condenses into rain or snow, and falls again to the surface.
- The water, which is a solvent, falling on land collects in rivers and lakes, soil, and porous layers of rock, and much of it flows back into the ocean.
- Salts have become concentrated in the sea (compared with freshwater) because the sun's heat causes the evaporation of water, leaving the salts behind.
- Underneath the ocean, the Earth has plains, mountains, and valleys, which are often larger than those on dry land.
- Ocean currents can be caused by factors such as wind, salinity, temperature, the Coriolis Effect, and gravitational pull.
- Ocean currents flow in predictable patterns around the world.
- The moon's gravitational pull and the spinning of the earth cause ocean water to bulge, producing tides.
**ESSENTIAL QUESTIONS:**

*Overarching Essential Questions:*
How does the location of water on Earth's surface and the conditions of the atmosphere affect its path through stages of the water cycle?

*Topical Essential Questions:*
How does the amount of saltwater differ from the amount of freshwater on Earth?

Does salt water and fresh water move through the same water cycle?

Where does salt in the ocean come from?

Why does water continually move through the water cycle?

How are the geological features that exist on land similar to the geological features on the ocean floor?

**KNOWLEDGE:**

The student will know:

- that H₂O is a compound that can exist as a liquid, solid or a gas.
- H₂O cycles through states of matter in the atmosphere based on atmospheric conditions
- the water cycle has three stages: precipitation, evaporation, and condensation
- the differences between oceans, rivers, lakes, underground water and glaciers(ice)
- the difference between salt water and fresh water
- that salt water is not for human consumption
• differences in density and/or temperature causes currents
• the earth's oceans are connected
• Almost 80% of the Earth's surface is covered by water.
• Water is not evenly distributed, and most of it is unsuitable for drinking.
• Of the total volume water on the Earth (1.36 billion km³, or 326 million mi³):
  • 97.2% is in the oceans as salt water,
  • 2.15% is frozen in ice caps and glaciers,
  • 0.65% is fresh water in lakes and streams, groundwater, and water vapor in the atmosphere.
• We can use less than one percent of the water on Earth for drinking and personal hygiene. We also use this fresh water for agriculture, fisheries, transportation, heating and cooling, manufacturing, and many other purposes.
• Unfortunately, unless we use our freshwater wisely, rivers, lakes, and groundwater can become depleted or polluted, and unavailable or unsuitable for life.

CONCEPTS:
Forces, gravity, heat movement, oceanography

LANGUAGE:
Significant role of water, Earth processes, atmospheric conditions, stages, water cycle, composition, location, subsurface topography, waves, currents, and tides, energy, conservation, physical processes, erosion, deposition, gravity, geological features, natural resources.
<table>
<thead>
<tr>
<th>MISCONCEPTIONS</th>
<th>PROPER CONCEPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most of Earth's freshwater is found in streams and lakes.</td>
<td>Most of the freshwater on Earth is located in glaciers and ice caps.</td>
</tr>
<tr>
<td>Our water comes out of visible, readily accessible sources.</td>
<td>Much of our municipal and industrial water comes out of the ground.</td>
</tr>
<tr>
<td>Groundwater is found as freely flowing underground rivers or lakes.</td>
<td>Groundwater is water that occurs as a liquid resource that is dispersed through innumerable holes, pores, fractures and cavities in bodies of rock or sediment.</td>
</tr>
</tbody>
</table>

**EVIDENCE OF LEARNING:**

By the conclusion of this unit, students should be able to demonstrate the following competencies:

**Culminating Activity:**
- **Goal:** To present information related to hydrology and oceanography
- **Role:** You are an outstanding science student who has been approached by the Department of Natural Resources (DNR)
- **Audience:** Members of the DNR

**Situation:** DNR has contacted your school to ask for your assistance because of your outstanding science abilities. They have noticed that several populations of species are declining both in freshwater and saltwater locations. They would like for you to use your knowledge of hydrology and oceanography to help determine the causes of these changes. DNR needs to know more about the composition, location, and subsurface topography of the oceans to determine if these factors might affect the identified populations. In addition, DNR needs clarification on where water is located throughout the Earth. DNR would also like for you to look at the water cycle to determine if it could have any affect and whether any atmospheric conditions could cause changes in water availability. You will also need to look at the causes of waves, tides, and currents to see if they could affect living organisms.

**Product:** Use any form of presentation you choose (PowerPoint, models, drawings, etc.) to provide DNR with requested information. Follow the "Hydrology and Oceanography Rubric" for the presentation.
# Georgia Performance Standards Framework for Science – Grade 6

## Hydrology and Oceanography Rubric

<table>
<thead>
<tr>
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<th>2</th>
<th>1</th>
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</thead>
<tbody>
<tr>
<td><strong>Location of Water on Earth</strong></td>
<td>Thoroughly and accurately includes the location of water on Earth (oceans, rivers, lakes, underground water, and ice)</td>
<td>Accurately includes the location of water on Earth (oceans, rivers, lakes, underground water, and ice), but not very thoroughly</td>
<td>Includes accurate information of some locations of water on Earth (oceans, rivers, lakes, underground water, and ice), but not all</td>
<td>Includes inaccurate or no information of the location of water on Earth</td>
</tr>
<tr>
<td><strong>Water Cycle</strong></td>
<td>Thoroughly and accurately includes information about the water cycle and how atmospheric conditions relate to it</td>
<td>Accurately includes information about the water cycle and how atmospheric conditions relate to it, but not very thorough</td>
<td>Includes accurate information about the water cycle, but does not relate atmospheric conditions to it</td>
<td>Includes inaccurate or no information about the water cycle</td>
</tr>
<tr>
<td><strong>Composition, Location, and Subsurface Topography of World's Oceans</strong></td>
<td>Thoroughly and accurately includes information about the composition, location, and subsurface topography of the world's oceans</td>
<td>Accurately includes information about the composition, location, and subsurface topography of the world's oceans, but not very thoroughly</td>
<td>Accurately includes information about either the composition, location, or subsurface topography of the world's oceans, but not all three</td>
<td>Includes inaccurate information about the composition, location, or subsurface topography of the world's oceans</td>
</tr>
<tr>
<td><strong>Cause of Waves, Currents, and Tides</strong></td>
<td>Thoroughly and accurately details the causes of waves, currents, and tides</td>
<td>Accurately details the causes of waves, currents, and tides, but not very thoroughly</td>
<td>Accurately includes details about the causes of waves, currents, or tides, but not all three</td>
<td>Includes inaccurate information about the causes of waves, currents, or tides</td>
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### TASKS

The collection of the following tasks represents the level of depth, rigor and complexity expected of all physical science students to demonstrate evidence of learning.

<table>
<thead>
<tr>
<th>Task:</th>
<th>Description:</th>
<th>Discussion, Suggestions for use:</th>
<th>Possible Solution:</th>
</tr>
</thead>
</table>

### SAMPLE OF STUDENT WORK

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Georgia Department of Education  
Kathy Cox, State Superintendent of Schools  
Unit Organizer: Water in Earth’s Processes  
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