Milestones Domain/Weight: Hydrology 40% [includes meteorology]

Purpose/Goal(s): Within this domain, students should understand the causes of waves, tides, and currents. They are also expected to know that water covers most of Earth and be able to describe the topography and composition of the ocean. Finally, students will understand the role of the Sun as the major source of energy and its relationship to wind and water energy.

Content Map: Hydrology Content Map

Content Descriptors: Hydrology Content Descriptors

Content from Frameworks: Hydrology Content from the Frameworks

Prerequisites: Elementary Standards for Hydrology

Unit Length: Approximately 16 days

Hydrology Unit Test Study Guide | Hydrology Unit Test Study Guide KEY

Click on the links below for resources by Essential Question:

EQ 1: Where is the Earth's water located?

EQ 2: What is the composition of the Earth's oceans and where are they located?

EQ 3: How does the temperature and salinity of water affect density?

EQ 4: How are waves and currents created?

EQ 5: How does the water cycle explain various atmospheric conditions on the Earth?

EQ 6: What happens to the energy Earth receives from the sun?
# TCSS 6th Science Hydrology Unit

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<td><strong>Standard(s):</strong></td>
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<td>S6E3a, Sample Assessment Items</td>
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</table>
| S6E3a. Explain that a large portion of the Earth’s surface is water, consisting of oceans, rivers, lakes, underground water, and ice. | Essential* Ice River Lake Ocean Underground water Supplemental** Glaciers Glaciation Saltwater Polar ice Freshwater Groundwater (infiltration) | The resources below are set up in a model lesson format. The first resource is a ppt which provides guidance for the entire lesson including activating, teaching and summarizing strategies. The activities listed below the ppt are used during the lesson and are identified for use where they are most likely appropriate in the ppt. The resources can be used as an entire lesson or pulled out for use separately.  
- Activating Strategy [select one]  
  - How Wet is Our Planet Demonstration ["I Do" and "We Do"] – The teacher facilitates a classroom demonstration of the amount of water on the earth’s surface  
  - Water on Earth Demonstration ["I Do" and "We Do"] – The teacher facilitates a classroom demonstration of the amount of water on the earth’s surface  
- Location of Water PPT ["I Do" “We Do” and “You Do”] See “Notes” on ppt slides for suggested instructional approaches where applicable or view the Location of Water PPT Notes  
- Location of Water on Earth Notes ["You Do"] – the students use the notes to record important information during the lesson  
- Additional Resources  
  - Water on Earth Count ["You Do" or “We Do"] – Students count squares on a world map grid to estimate the percent of the earth that is water and land  
  - Water on Earth Graphing ["You Do"] – Students graph the distribution of earth’s water  
  - Water Distribution Lab ["You Do" or “We Do”] - Students make a model of the earth’s water and then graph its distribution. Characteristics of Science Standards used: S6CS2, S6CS3, S6CS6  
- Video about the location of water: [http://education-portal.com/academy/lesson/the-distribution-of-water-on-earth.html#lesson](http://education-portal.com/academy/lesson/the-distribution-of-water-on-earth.html#lesson) | **Essential** | **Supplemental** |
| Essential Question:                |            |                         |            |
| 1. Where is the Earth’s water located? |            |                         |            |

*Essential Vocabulary listed in the GPS Standards  
**Supplemental Vocabulary listed in the state frameworks and/or other state document
# TCSS 6th Science Hydrology Unit

## Standard(s) and Essential Question

**Standard(s):**

S6E3c. Describe the composition, location, and subsurface topography of the world’s oceans.

**Essential Question:**

2. What is the composition of the Earth’s oceans and where are they located?

## Vocabulary

- **Essential***
  - Ocean Composition

- **Supplemental***
  - Hydrology Hydrosphere

*Essential Vocabulary listed in the GPS Standards

**Supplemental Vocabulary listed in the state frameworks and/or other state document

## Resources

The resources below are set up in a model lesson format. The first resource is a ppt which provides guidance for the entire lesson including activating, teaching and summarizing strategies. The activities listed below the ppt are used during the lesson and are identified for use where they are most likely appropriate in the ppt. The resources can be used as an entire lesson or pulled out for use separately.

- **Composition and Location of the Oceans PPT** [“I Do” “We Do” and “You Do”]
  - See “Notes” on ppt slides for suggested instructional approaches where applicable or view the **Composition and Location of the Oceans PPT Notes**

- **Composition and Location of the Oceans Notes** [“You Do”]
  - Students use the notes to record important information during the lesson

### Possible Activities:

- Use sheet protectors with maps and either do formative assessment led by the teacher or have students work with partners to quiz each other
- Use sheet protectors with maps and either do formative assessment led by the teacher or have students work with partners to quiz each other
- **Location of Oceans and Continents Worksheet** [“You Do”]
- **QR Codes:** Reviewing the Location of the Oceans [“You Do”] – students scan a QR Code to identify the ocean shown and then can scan a QR Code to check their work
- **Play Kahoot:** [https://play.kahoot.it/#/k/783b7b97-4964-41aa-ab10-2b4a91368d20] [“You Do”] - free Web 2.0 tool where students use their cell phone to answer questions and get points
- **Journal to the Ocean Activity** [“You Do”] - students select a salt and a method of transportation then write a short story or illustrate their journal to the ocean

### Summarizing Strategy:

- **Drop of Ocean Water Recipe** [“You Do”] - Each student should complete the summarizer. The teacher should use the summarizer to determine the level of student mastery and if differentiation is needed.

## Assessment

- **S6E3c. Sample Assessment Items**
**TCSS 6th Science Hydrology Unit**

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<tr>
<td><strong>Standard(s):</strong></td>
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<tr>
<td>This lesson introduces background knowledge needed to master upcoming hydrology and weather concepts; therefore, the standards listed below are indirectly addressed and will be taught more in-depth in future lessons.</td>
<td></td>
<td>The resources below are set up in a model lesson format. The first resource is a ppt which provides guidance for the entire lesson including activating, teaching and summarizing strategies. The activities listed below the ppt are used during the lesson and are identified for use where they are most likely appropriate in the ppt. The resources can be used as an entire lesson or pulled out for use separately.</td>
<td></td>
</tr>
<tr>
<td>S6E3c. Describe the composition, location, and subsurface topography of the world’s oceans.</td>
<td><strong>Essential</strong>*</td>
<td><strong>Temperature, Salinity and Density PPT</strong> [&quot;I Do&quot; “We Do&quot; and &quot;You Do&quot;] See “Notes” on ppt slides for suggested instructional approaches where applicable or view the Temperature, Salinity and Density PPT Notes</td>
<td><strong>S6E3c. Sample Assessment Items</strong> [use only items that apply to temperature, salinity, and density]</td>
</tr>
<tr>
<td>S6E3d. Explain the causes of waves, currents, and tides.</td>
<td><strong>Supplemental</strong></td>
<td><strong>Temperature, Salinity and Density Notes</strong> [&quot;You Do&quot;] – Students use the notes to record important information during the lesson</td>
<td><strong>Assessment items for S6E3d. do not need to be used during this lesson. They should be used after the next essential question on currents. The concepts in this lesson are foundational for understanding currents.</strong></td>
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<tr>
<td><strong>Essential Question:</strong></td>
<td></td>
<td><strong>Ice Cube Demonstration</strong> [&quot;I Do&quot; or &quot;We Do&quot;] – Teachers or students can do this activity in class or watch the video clip. A dyed ice cube is placed in warm water to illustrate that cold water is more dense than warm water.</td>
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</tr>
<tr>
<td>3. How does the temperature and salinity of water affect density?</td>
<td></td>
<td><strong>Demonstration of warm air expanding</strong> [&quot;I Do&quot; or &quot;We Do&quot;] – illustration of a demonstration or simple lab that can be conducted to show warm air expanding</td>
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<td><strong>How Density and Salinity Affect the Temperature of Water Activity video</strong> (will not work with chrome book)</td>
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<td><strong>Suggested Activities:</strong></td>
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<td></td>
<td>o <strong>Density of Liquids Activity</strong> [&quot;We Do&quot;]</td>
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<td>o Comparing the Density of Different Liquids [&quot;We Do&quot;]</td>
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<td>o <strong>What is density? Lab</strong> [&quot;We Do&quot;]</td>
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<td>o <strong>Salinity Lab</strong> [&quot;We Do&quot;]</td>
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<td></td>
<td>o <strong>Temperature, Salinity, and Density Writing Task</strong> or <strong>Temperature, Salinity, and Density Comic Strip</strong></td>
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</tbody>
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<tr>
<td></td>
<td>o <strong>Temperature, Salinity and Density Practice Worksheet</strong> [&quot;You Do&quot; or &quot;We Do&quot;]</td>
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<td></td>
<td>▪ Tiered assignment can be used for differentiation. Teachers can use the practice worksheet above as formative assessment. [Tiered Temperature, Salinity and Density Instructions]</td>
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<tr>
<td></td>
<td>▪ Glencoe Textbook Pages:</td>
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<tr>
<td></td>
<td>o S6E3c – page 543</td>
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<td></td>
<td>o S6E3d. 518-524 [waves]</td>
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<td>o S6E3d. 518 [currents]</td>
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<td></td>
<td>o S6E3d. 524-530 [tides]</td>
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</table>
| **Standard(s):**                  | Essential* Waves, Currents | - [Waves and Currents PPT] ["I Do" “We Do” and “You Do"] See “Notes” on ppt slides for suggested instructional approaches where applicable or view the [Waves and Currents PPT Notes](#)  
- [Waves and Currents Notes] ["You Do"] – Students use the notes to record important information during the lesson  
- Demonstrate the effect of the earth’s rotation (Coriolis Effect) on the direction of winds ["I Do" or “We Do"]  
  - [Modeling the Coriolis Effect] [Coriolis Demonstration](#)  
  - [View a video clip of a demonstration showing the effect of the Coriolis Effect](#)  
  - [Animation of Coriolis Effect] [linked in ppt](#)  
- [Videos and Animations](#)  
  - [Ocean Currents Song] [linked in ppt](#)  
  - [Waves and Currents Study Jams] [linked in ppt](#)  
  - [Brain Pop: Ocean Currents](#)  
  - [Animation of Surface Currents] [linked in ppt](#)  
- Lab or Demonstration illustrating temperature, salinity and density. Teachers can either conduct these labs in their classroom or watch the video clips. Another adaptation is to use colored ice cubes in the demonstrations  
  - Using warm water, cold water, and salt water to demonstrate currents video clip  
  - [Activity Density Currents](#)  
- Teachers there should be a Density Flow Model in your building. These were purchased for the purpose of demonstrating currents  
- [Waves and Currents Summarizer] ["You Do"] - Each student should complete the summarizer. The teacher should use the summarizer to determine the level of student mastery and if differentiation is needed  
- [Glencoe Textbook Pgs: Currents:518-523; Waves and Tides: 524-530](#) | - S6E3d. Sample Assessment Items |
| **Essential Question:** 4. How are waves and currents created? | Supplemental** Salinity, Density, Ocean currents, Surface currents, Density currents | - [Glencoe Textbook Pgs: Currents:518-523; Waves and Tides: 524-530](#) | - |
### Standard(s) and Essential Question

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<th>Standard(s):</th>
<th>Essential Question:</th>
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<tr>
<td>S6E3b. Relate various atmospheric conditions to stages of the water cycle</td>
<td>5. How does the water cycle explain various atmospheric conditions on the Earth?</td>
</tr>
</tbody>
</table>

### Vocabulary

- Essential*
  - Water Cycle
  - Atmospheric conditions

- Supplemental**
  - Dew
  - Fog
  - Rain
  - Sleet
  - Snow
  - Frost
  - Cloud
  - Runoff
  - Water vapor
  - Evaporation
  - Precipitation
  - Transpiration
  - Condensation

*Essential Vocabulary listed in the GPS Standards

**Supplemental Vocabulary listed in the state frameworks and/or other state document

### Resources

The resources below are set up in a model lesson format. The first resource is a ppt which provides guidance for the entire lesson including activating, teaching and summarizing strategies. The activities listed below the ppt are used during the lesson and are identified for use where they are most likely appropriate in the ppt. The resources can be used as an entire lesson or pulled out for use separately.

- The standard for this lesson is about atmospheric conditions in relation to the water cycle; therefore, the lesson is not about the stages of the water cycle. However, the students must first know the stages of the water cycle, in which they learned in elementary school. Before the lesson can move on to atmospheric conditions, the teacher must first test student knowledge of the stages of the water cycle. Water Cycle Pretest ["You Do"]
  - Water Cycle & Atmospheric Conditions PPT ["I Do" "We Do" and "You Do"] - See "Notes" on ppt slides for suggested instructional approaches where applicable or view the Water Cycle & Atmospheric Conditions PPT Notes
  - Resources to review the water cycle and/or differentiate if needed [select just a few resources, not all]
    - Water Cycle Adventure ["We Do"]
    - Water Cycle Game ["We Do"]
    - Water Cycle Review handout ["You Do"]
    - Stages of the Water Cycle Foldable Sample ["You Do"]
  - Videos/Animations:
    - When differentiating or using small groups, these websites can be used with a smart board, smart projector, or promethean board. Students can come to the board as the teacher monitors while working with small group. These websites can also be used in computer labs or with chrome books as reinforcement
      - http://player.discoveryeducation.com/views/hhView.cfm?guidAssetId=087777c8-4f10-45d2-878f-e7cd907ee19

### Assessment

- S6E3b. Sample Assessment Items
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<td>▪ Labs/Demonstrations of Condensation [&quot;I Do&quot; or “We Do&quot;] – select one or two of the activities</td>
<td></td>
<td>▪ Cloud in a Bottle [1]</td>
<td>▪ London Fog – Anywhere You Want It</td>
</tr>
<tr>
<td>▪ ▪ Water Cycle and Atmospheric Conditions Summarizer [&quot;You Do&quot;] - Each student should complete the summarizer. The teacher should use the summarizer to determine the level of student mastery and if differentiation is needed.</td>
<td></td>
<td>▪ Cloud in a Jar</td>
<td></td>
</tr>
<tr>
<td>▪ Glencoe Textbook Pages: 437</td>
<td></td>
<td>▪ London Fog – Anywhere You Want It</td>
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<td></td>
<td></td>
<td>▪ Does Cooling Water Vapor Increase Condensation</td>
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<td>▪ Teacher</td>
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<tr>
<td><strong>Standard(s):</strong></td>
<td>Essential*</td>
<td>• This lesson provides foundational content that will be applied to the weather and climate unit for convection currents and the distribution of heat on the Earth.</td>
<td><strong>No Assessment Items Needed</strong></td>
</tr>
<tr>
<td>S6E3b. Relate various atmospheric conditions to stages of the water cycle</td>
<td>Suplemental**</td>
<td>• Energy Transfer PPT [&quot;I Do&quot; &quot;We Do&quot; and &quot;You Do&quot;] - See &quot;Notes&quot; on ppt slides for suggested instructional approaches where applicable or view the Energy Transfer PPT Notes</td>
<td></td>
</tr>
<tr>
<td>S6E2c. Relate the tilt of the earth to the distribution of sunlight throughout the year and its effects on climate</td>
<td>*Essential Vocabulary listed in the GPS Standards</td>
<td>• Energy Transfer Summarizer [&quot;You Do&quot;] - Each student should complete the summarizer.</td>
<td></td>
</tr>
<tr>
<td><strong>Essential Question:</strong></td>
<td><strong>Suplemental Vocabulary listed in the state frameworks and/or other state document</strong></td>
<td>• Glencoe Textbook Pages: 435-436</td>
<td></td>
</tr>
<tr>
<td>6. What happens to the energy Earth receives from the Sun?</td>
<td><strong>Conduction, Convection, and Radiation Video [3:53]</strong></td>
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</table>
TCSS 6th Characteristics of Science Standards

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.
a. Write clear, step-by-step instructions for conducting scientific investigations, operating a piece of equipment, or following a procedure.
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.
TCSS 6th Characteristics of Science Standards

S6CS7. Students will question scientific claims and arguments effectively.
a. Question claims based on vague attributions (such as “Leading doctors say...”) or on statements made by people outside the area of their particular expertise.
b. Recognize that there may be more than one way to interpret a given set of findings.

The Nature of Science

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.
e. The ethics of science require that special care must be taken and used for human subjects and animals in scientific research. Scientists must adhere to the appropriate rules and guidelines when conducting research.