

HISI - LESSON OUTLINE

Module Title Water This!

LS Team KTJUSD

Grade level: 9th

Lesson # 2 Title: Water This	Number of Minutes: 140 min (2 50min lessons)																												
<p>Mathematical purpose: Visualize the proportions of water distribution throughout the world.</p>	<p>Scientific Purpose: To model how water cycles through the atmosphere, biosphere, and geosphere. Then to apply these concepts to the Trinity River watershed and model how watersheds flow into to river system.</p>																												
<p>Materials needed:</p> <table border="0"> <tr> <td>Demo 1: Water on Earth</td> <td>Demo 2: Ecosystem in a Bottle</td> </tr> <tr> <td>Bucket of water 9.5L</td> <td>Clear container, rocks, water, soil and plants.</td> </tr> <tr> <td>8 clear plastic cups- labeled</td> <td></td> </tr> <tr> <td>Eye dropper</td> <td>Activity:</td> </tr> <tr> <td>100 mL graduated cylinder</td> <td>plain white paper</td> </tr> <tr> <td>Map of Trinity river system</td> <td>paper towels</td> </tr> <tr> <td>1000 mL Beaker</td> <td>water based colored markers</td> </tr> </table>	Demo 1: Water on Earth	Demo 2: Ecosystem in a Bottle	Bucket of water 9.5L	Clear container, rocks, water, soil and plants.	8 clear plastic cups- labeled		Eye dropper	Activity:	100 mL graduated cylinder	plain white paper	Map of Trinity river system	paper towels	1000 mL Beaker	water based colored markers	<p>Academic vocabulary:</p> <table border="0"> <tr> <td>groundwater</td> <td>resources</td> </tr> <tr> <td>Infiltration</td> <td>nonrenewable</td> </tr> <tr> <td>runoff</td> <td>community</td> </tr> <tr> <td>precipitation</td> <td>ecosystem</td> </tr> <tr> <td>condensation</td> <td>transpiration</td> </tr> <tr> <td>evaporation</td> <td>tributary</td> </tr> <tr> <td>ecosystem</td> <td></td> </tr> </table>	groundwater	resources	Infiltration	nonrenewable	runoff	community	precipitation	ecosystem	condensation	transpiration	evaporation	tributary	ecosystem	
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<p>Common Core Standards (copy and paste):</p> <p>WHST.9-12.7 Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.</p> <p>HSN. Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.</p>	<p>Next Generation Science Standards (copy and paste):</p> <p>HS-ESS2-5 Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes.</p> <p>Emphasis is on mechanical and chemical investigations with water and a variety of solid materials to provide the evidence for connections between the hydrologic cycle and system interactions commonly known as the rock cycle. Examples of mechanical investigations include stream transportation and deposition using a stream table, erosion using variations in soil moisture content, or frost wedging by the expansion of water as it freezes. Examples of chemical investigations include chemical weathering and recrystallization (by testing the solubility of different materials) or melt generation (by examining how water lowers the melting temperature of most solids)</p>																												

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<p>When students are finished they will understand:</p> <p>Students will understand how water moves and is cycled around the earth, what percentage of water is freshwater and of that how much is available for our use. Student will understand how tributaries contribute to a river system and how this affects a local river, the Trinity.</p>	<p>What are teacher questions or prompts?</p> <p>What are the steps of the water cycle? How do you use water? Is water a renewable resource? How much of the world's water is available for us to use? What are we observing in our ecosystem? Where does the water for Trinity come from? Where is the water going? How does pollution affect our river? What about pesticides and runoff? Can they get in our watershed? How? What would that do to the ecosystem there?</p>
<p>What are questions you anticipate students will have?</p> <p>How do we know how much water is on Earth? Why can't we just clean the ocean water? Won't the plant die? Don't we need to water our plant? How does the plant get water? Is river water safe to drink? Does all the water go to the river?</p>	<p>What are misconceptions students might have?</p> <p>It is easy to desalinate ocean water. The plants in the ecosystem will die if we don't add more water or poke holes in the container.</p>
<p>General outline of the lesson:</p> <p>Day 1</p> <p>Introduction: Students will take their seats and copy questions for a Quick Write that explores their prior knowledge and experience with the water cycle. Students will share answers and ideas. Through a think-pair-share. Teacher then tells students we are going to investigate the answers to the questions. Teacher fills a glass of water and places it on a desk. " How old do you think this water is?" Teacher discusses questions with students using Water Notes.</p> <p>Demo 1: Teacher does Earth's Water demo, which uses 10,000 mL of water to represent all the water on Earth and then divvy it up into Icecaps/glaciers, Groundwater, Freshwater Lakes, Great Lakes, Saltwater Lakes/Seas, Atmosphere, Rivers/Streams, and Unaccounted for. Teacher demonstrates measuring techniques and students help figure out how much goes in each container. Students calculate percentages of water in each category. Students answer Water on Earth Questions in groups, each student writes out their own answer. *</p>	

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Day 2

Quick Draw: Teacher draws a drop of water on the board and asks the students to draw what happens to a drop of water after it falls from the sky. “Yesterday, we talked about water as a nonrenewable resource, yet it rains. Does this mean we are getting more water?” This should be a review of the water cycle for the students. Students draw out what happens to the water, it should resemble steps in the water cycle.

Demo 2: Teacher shows students a completed Ecosystem in a Bottle that was made at least 1 day in advance and talks about when and how it was made. (The Ecosystem in a Bottle extension could be started before this lesson so students can use their own ecosystems.)The class discusses how it represents an ecosystem. Then students identify the steps in the water cycle using the ecosystem. Teacher asks “Where is the water? What is on the side of the bottle? What is in my rocks at the bottom of the bottle? How is this like the ecosystem? Does it rain in the bottle?”

If doing extension: The teacher talks about what is needed in an ecosystem and builds an ecosystem in a bottle with the class. Student should be thinking about how they are going to build their ecosystem, what materials they will need to bring in, what plants/bottles they want to use, etc. *

Activity: Teacher tells students “Yesterday we said the amount of fresh drinking water available to us is limited, where do we get our drinking water? Students discuss sources. Teacher asks about local rivers? “What about the Trinity river? Where does the water come from that is flowing down that river system?” Teacher talks about watersheds and then shows a picture of the Trinity river watershed. Students are paired up and each pair gets 1 piece of plain white paper, paper towels, and markers. Teacher demonstrates how to do activity. Students crumple up the paper in a ball and then partially open it back up, placing it on a paper towel on a desk. The crumpled paper should resemble mountains ridges and valleys. Using the markers students color in where they think they area of the watershed are. 1) Rivers and streams (blue), 2) mountain ridges (black), 3) Exposed soil the could erode into a lake or river (Brown), and 4) Pollutants that may be found near their watershed (Red). Then the teacher sprays a light mist over each model and students observe where the water actually runs and collects.

Questions to Consider:

1. What do you thin the paper represents?
2. What do think the spray represents?
3. Why does the water flow into the creases?
4. What would you call the water that runs down in the creases?
5. What would you call the water that collects in pools?
6. What happened to the ink from the markers as the water flowed? Where did it go?

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7. How is it a problem if the inks represent pollutants?

Supplemental files/resources will follow

Quick Write

-Answer each question with at least one complete sentence

1. How much of the Earth's surface is covered with water?
2. How much of your body is made of water?
3. Why is it important to have clean drinking water?
4. Can we recycle water? How?
5. Is water a renewable resource?

Water Notes: *

- About 70% of the Earth's surface is covered with water, hence the name given to Earth as the "Water Planet"
- Your body is made of 60-70% water
- All living things depend on water to exist.
- Water from a recent rain storm it could be the same water that a Tyrannosaurus Rex Dinosaur drank millions of years ago.
- Centuries ago water usage was done without money of cost and bodies of water were well taken care of by Indigenous communities who considered water to be sacred.

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- Water is considered a Nonrenewable resource. Some scientist believe that all water there is present on the Earth, in all forms – solid, liquid, gas, has been here since the beginning of the life on Earth. It’s all we have and we need to take care of it. It continues to recycle but we need to be mindful of how much of the available water we consume.

Demo 1:

Teacher tells students that we are going to use 1000mL to represent all the water on Earth. Then says we are going to divide it up into categories based on where it is found. The teacher then label each of the containers. The teacher displays the following chart on the board.

Oceans	9,720.0mL
Icecaps/Glaciers	200.0mL
Groundwater	67.0mL
Inland Seas / Salt Lakes	.8mL (16 drops)
Freshwater Lakes	0.72mL (14 drops)
Great Lakes	0.18mL (4 drops)
Atmosphere	0.1mL (2 drops)
All Rivers and Streams	0.01mL (dab it)
Unaccounted for	16.19mL

Teacher divvies up the water accordingly. Students direct the teacher. Teacher asks guiding questions, “Should I measure it out with this? Is this accurate, how do I know if it’s accurate, which beaker should I use?”

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Water on Earth

Answer the following questions using information learned from the Demonstration

1. Is the distribution of water on Earth fairly even?
2. Is much of the total water on Earth available for human use?
3. Does it seem important for us to water over our freshwater supply and protect it from pollution? Why?
4. Why is this an example of the Core Democratic Value – Common Good?

Demo 2:

Teacher creates an ecosystem in a bottle at least one day before hand.

http://www.ehow.com/how_5164713_make-ecosystem-bottle.html

Lessons Adapted from:

<http://learningtogive.org/lessons/unit374/lesson1.html>

Extensions:

Ecosystem in a Bottle / The Water Cycle

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<https://www.pcc.edu/about/events/sustainability-training/documents/ecosystem-in-a-bottle.pdf>

<http://www.dailymail.co.uk/sciencetech/article-2267504/The-sealed-bottle-garden-thriving-40-years-fresh-air-water.html>

<http://reekoscience.com/science-experiments/miscellaneous/how-to-create-terrarium-vivarium-self-sustainable-bottle-garden>

<http://www.thegeoexchange.org/carboncycle/projects/bottle-ecosystem.html>

* **Accommodations:** Designed to accommodate for student with Specific Learning Disabilities (SLD) with processing disorders in Auditory and/or Visual processing, SLD with processing disorder in Attention or Cognitive Abilities, and Other Health Impairments (ADD, ADHD).

DAY 1/Introduction

- ❖ Provide copy of Water Notes for note taking support

DAY 1/Demo 1

- ❖ Provide calculator for calculating percentages
- ❖ Provide percentage calculation template (formula/steps)
- ❖ Provide a labeled table to enter percentages into

DAY 2/Extension

- ❖ Provide different example lists of materials needed for their ecosystem if needed

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