

Connecticut Water Company

Water Conservation Challenge Curriculum

GRADES: 3

TIME: 45-60 minutes

SETTING: Classroom

PURPOSE:

Learning how much freshwater is available on Earth and how it is commonly used, we can understand how to reduce our personal water use by using water more efficiently.

OBJECTIVES:

- Students will estimate how much of the earth is covered with water.
- Students will state different places where water can be found on planet earth.
- Students will state land areas where water is abundant and where it is scarce.
- Students will state how much fresh water is available on earth.
- Students will state four methods for conserving water / reducing water use at home.

BACKGROUND:

Earth is often referred to as “the blue planet,” because, when viewed from space, you can see that most of the planet consists of water. Earth is made up of approximately 70% water, most of which is found in oceans that are salt rich. After oceans, the next most common place water is found is glaciers and ice, followed by groundwater and then fresh surface water (lakes, ponds, rivers, etc). Water is essential to all life on our planet and many species – humans included – depend on clean, fresh water for survival. Unfortunately, fresh water is scarce and it is distributed unevenly around the globe; some regions are hot, dry deserts while others are damp and lush with vegetation. Even in water-rich environments, it is important to conserve water so there is enough clean water to meet the needs of humans and wildlife alike.

ACKNOWLEDGEMENTS:

The activities in this program combine elements adapted from the following lesson plans published in *Project WET Curriculum and Activity Guide, Generation 2.0* (2011): "Blue Planet" (page 125); "Incredible Journey" (page 155); "A Drop in the Bucket" (page 257); and "My Water Footprint" (page 441).

CURRICULUM CONNECTIONS

Next Generation Science Standards (NGSS)

- 3-ESS2-2. Weather and Climate. “Obtain and combine information to describe climates in different regions of the world.”
- 3-ESS3-1. Earth and Human Activity. “Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.”
- 3-5-ETS1-2. Engineering Design. “Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.”

Common Core - Mathematics

- 3.MD.A.2 “Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.”

CLOSURE/ASSESSMENT:

- Students can name at least at least four places that water is found on earth.
- Students can explain that water is not distributed evenly on earth, and that freshwater is the least abundant water resource.
- Students can describe different ways they use water every day, and explain that some things use a lot more water than others.
- Students can brainstorm ways to reduce their daily water use. Students may be able to calculate how much water they can save each day with the choices they make.

Part 1 - The Blue Planet

Time: 10 minutes

Objective: Students will estimate how much of the earth is covered with water. Students will state different places where water can be found on planet earth. Students will state land areas where water is abundant and where it is scarce.

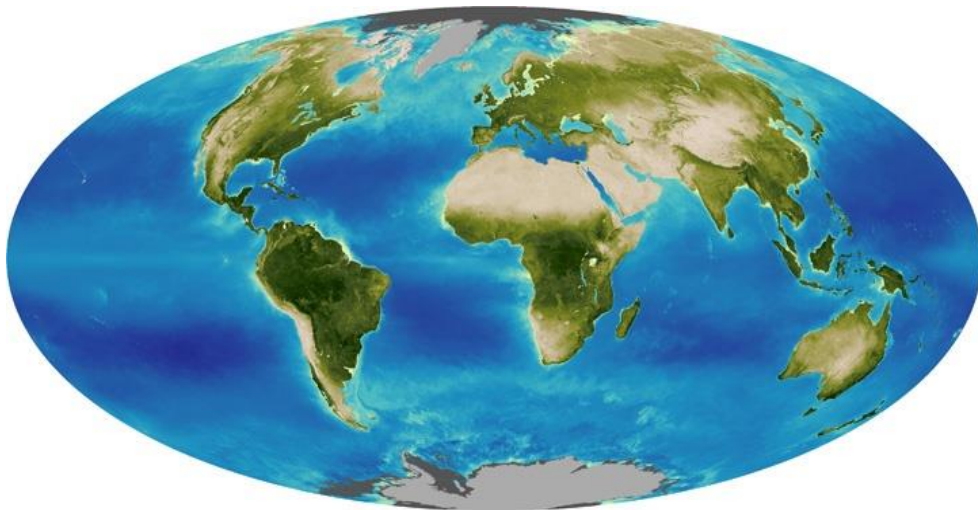
Materials: Inflated globe beach ball

Overview: In this part of the activity, students will conduct a beach ball toss around the classroom to estimate how much of our planet is covered in water.



The Activity:

1. Have students pass the beach ball to their neighbor 20 times and have them share with the class where their right thumb landed - on land or on water. Keep a tally on the board. If their thumb covered land, ask them to share if the land is brown or green (water rich/water poor). Keep a sub-tally of green vs. brown. If on water, ask them to share if they landed on ice, ocean, or other. Keep a sub-tally.
2. Use the results of the ball toss to show the planet is covered with more water than land (70% water).
3. Discuss the results of the sub-tally under water for ice, ocean, other to introduce the concept that most of our water is located in the oceans, followed by ice caps (glaciers), and then lakes, rivers, and streams.



Water = 70.1%

Land = 29.9%

Part 2 - The Incredible Journey

Time: 15 minutes

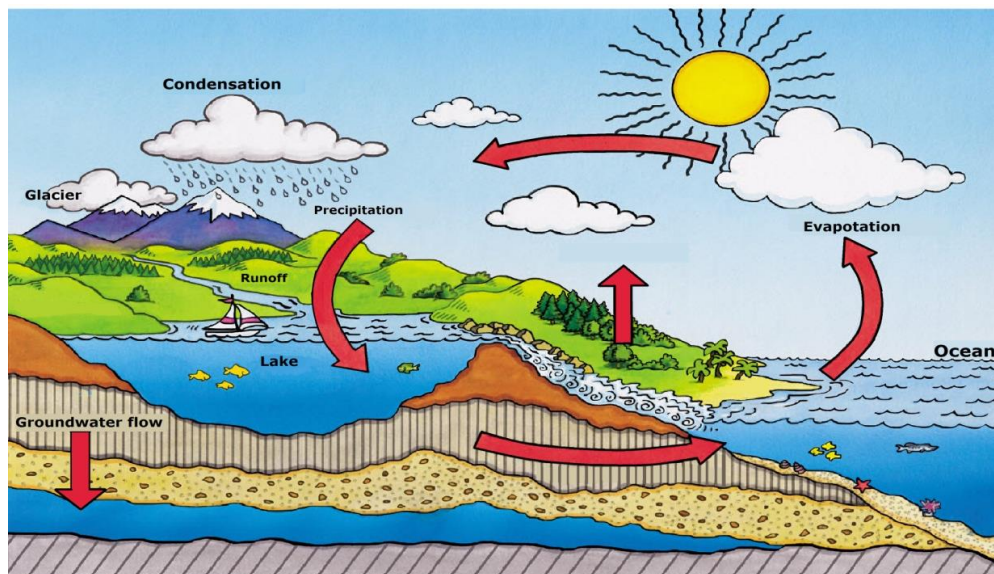
Objective: Students will state different places where water can be found on planet earth.

Materials: 1 set of Water Cycle Spinners (Attachment 1); Laminated Water Cycle Poster; Dry Erase Marker; Stack of index cards with Water Cycle station names.

Overview: In this part of the activity, students will help an imaginary water drop cycle its way around the planet - moving between different places where water can be found.

The Activity:

1. Ask students to share their ideas about the various places water can be found other than the obvious places like oceans, lakes, streams. These less obvious places include: underground/soil, glaciers, clouds, plants, and animals.
2. Distribute the spinners around the classroom. Tell the class to imagine a droplet of water and explain that the water drop is about to go on an “incredible journey” around the planet.



3. Have one student randomly select the starting point for the water droplet by picking a card from the stack of index cards.
4. Using the water cycle poster as a map, draw an X for the water droplet's starting point. Ask the student with the corresponding spinner to spin the dial and determine where the drop will move next. Draw an X on the poster and arrow to trace the droplet's journey. After a student has had a chance to spin, have them pass the spinner off to the student next to or behind them. Continue for journey for 10 spins.
5. Repeat steps 3 and 4 to trace another journey or two.
6. Ask students to make observations about the different journeys. Where were there any surprises? For example, did the student get stuck in the ocean the entire time? Or stuck in the glacier? Ask students to share ideas about why that might be; make connections back to the ball toss and the distribution of water around the planet. If time allows, briefly discuss how water would move from one place to another (precipitation, condensation, evaporation, etc).

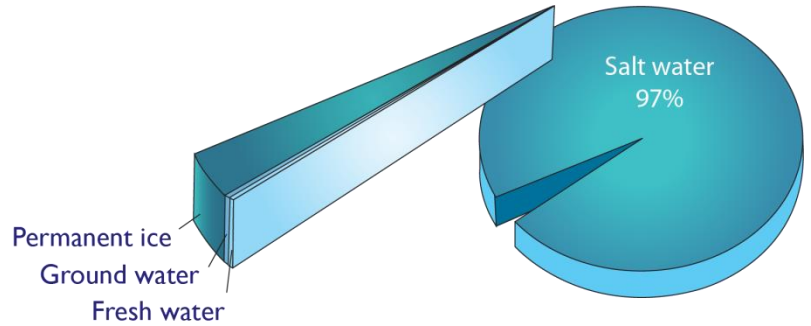
Part 3 - A Drop in the Bucket

Time: 5 minutes

Objectives: Students will state different places where water can be found on planet earth. Students will state how much fresh water is available on earth.

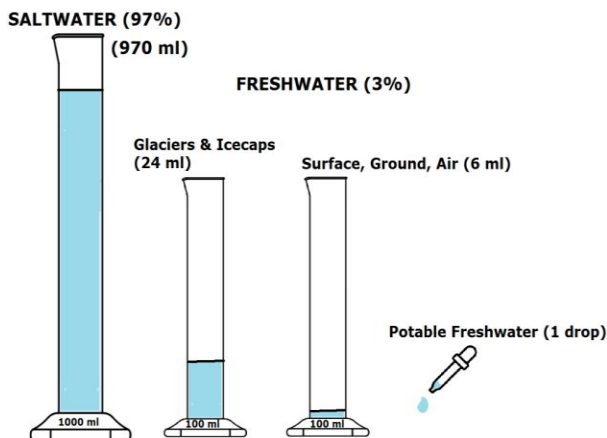
Materials: Graduated Cylinders (one 1000mL, two 100 mL), Eye Dropper, Water, Blue Food Coloring.

Overview: In this part of the activity, the graduated cylinders will be used to give students a visual of where water is found on the planet and how freshwater makes up a very small percentage of that water.



The Activity:

1. From the large container of blue water, fill the largest cylinder with 1000 mL of water. Put the jug away and tell students that this cylinder represents ALL the water on the planet.
2. Ask students where most of our planet's water is found. 97% of our water is located in the oceans (as observed in the ball toss and water cycle game). Pour 30 mL into 100 ml cylinder.
3. Explain to students that the remaining 30 mL represents all of our freshwater. Of this freshwater, 24 ml of it is frozen and found at our polar ice caps.
4. Pour 6 mL into the other 100 mL cylinder. This is the "available" freshwater -- groundwater, rivers, lakes, streams, ponds, and atmosphere. Refer back to the land tally from the ball toss (brown vs. green) as a lead to discussing the availability of water around the globe -- some places are lush/water rich and others are arid/water poor.
5. Ask students to consider how much of this "available" fresh water they can actually drink. Underscore reasons why much of this water may not be safe for our consumption (pollution being a big cause). Use the eye dropper to withdraw a single drop from the 6 mL of "available" freshwater and explain to students this is how much of the planet's water is safe to drink.



| <u>Earth's Total Water Supply</u> | <u>(100%)</u> |
|------------------------------------|---------------|
| Oceans | 97.25% |
| Glacial and Other Land Ice | 2.051% |
| Groundwater | 0.68% |
| Rivers & Lakes | 0.0101% |
| Atmosphere/Soil Moisture/Biosphere | 0.00604% |

Part 4 – My Water Footprint

Time: 15 minutes

Objectives: Students will identify varying volumes of water they use in common, daily activities. Students will state methods for conserving water or reducing water use at home.

Materials: Empty 1 Gallon Jug for Visual Reference, Worksheets

Overview: In this part of the activity, students will get a sense for the volume of their daily water usage and explore engineering solutions for using less water and/or using it more efficiently.

The Activity:

1. Ask a few students to share with the class one or two ways they used water today. Jot them down on the board for later reference. Looking at common items, ask the students, by a show of hands, how many people flushed the toilet today? How many brushed their teeth? Washed their face? Put on clean clothes? Ate off clean plates? Discuss how all of these activities require us to use water, and some activities more water is used than others.
2. Ask a couple students to share with you how many people live in their home. Explain to the class that a person typically uses the toilet about 4 times a day (once in the morning, once at lunchtime, once around dinner, once before bed). Explain that each time you flush a modern toilet it uses 2 gallons of water. Then remind students that afterwards we wash our hands, which uses approximately another 1 gallon. That means, every time one person in your household uses the restroom, the use approximately 3 gallons of water. And, if you go 4 times a day, you are using 12 gallons of water. Now explain that in a household of 4 people, water use in the bathroom along adds up to about 48 gallons of water.
3. Now, using the worksheet, have students add up their water use. Have them consider if that is a lot, a little, or somewhere in between. Then, ask students to think about how they might be able to reduce their water use. How could they (or their family) save the most water?
4. Introduce the Water Conservation Pledge. Tell students about the competition between classrooms in the Connecticut Water Company service area. The classroom that returns the greatest number (percentage) of signed pledges will be eligible to be entered into a drawing win a field trip to the Connecticut Science Center.



My Water Footprint

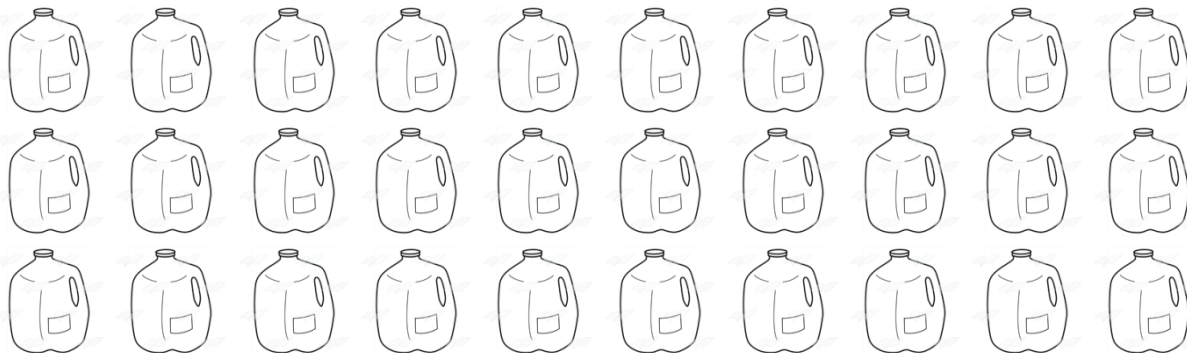


Calculate Your Daily Water Use. In the first blank column, write the number of times you use water in one day. Then, multiply that number by the amount of water the activity uses. Write the answer in the last column. Add up all of the numbers in that column to see how much water you used in a day.

Example: You brush your teeth 2 times in one day. Each time you brush, you use 1 gallon of water. Multiply 2×1 to find the total amount of water used for this activity.

| Water Use Activity | Number of Times in One Day | | Amount of Water Used Each Time | = | Total Water Used* |
|-------------------------|----------------------------|---|--------------------------------|---|-------------------|
| Brushing Teeth (30 sec) | | X | 1 gallon | = | |
| Washing Hands (30 sec) | | X | 1 gallon | = | |
| Flushing a Toilet | | X | 2 gallons | = | |
| Taking a Shower (8 min) | | X | 16 gallons | = | |
| Taking a Bath | | X | 70 gallons | = | |
| Total = | | | | | |

***Hint:** Use the empty gallon jugs below to help find the total water used. Color in the number of gallons used for each time you do one of the activities above. For example, color in $1 \frac{1}{2}$ gallons for every time you flush the toilet, then count up the total water used.



1. For which activity did you use the most water? _____
How much water did you use for that activity? _____

2. Numbers in the chart are based on averages. You can reduce the amount of water you use by taking shorter showers or turning the sink off while you brush your teeth. Taking a shower for 8 minutes used about 16 gallons. How much water does a 4-minute shower use?

3. Besides those listed in the chart, what other activities to you use water for? _____

BONUS: Calculate how much water you use in one week. _____



My Water Footprint



Take home and discuss with your family.

How else do you and your family use water?

| Water Use Activity | Number of Times in One Day | | Amount of Water Used Each Time | | Total Water Used* |
|--|----------------------------|---|--------------------------------|---|-------------------|
| Brushing Teeth (30 sec) | | X | 1 gallon | = | |
| Washing Hands (30 sec) | | X | 1 gallon | = | |
| Flushing a Toilet | | X | 2 gallons | = | |
| Washing face | | X | 1 gallon | = | |
| Taking a Shower (8 min) | | X | 16 gallons | = | |
| Taking a Bath | | X | 70 gallons | = | |
| Drinking water (8 8 ounce glasses per day) | | X | 1/2 gallon per day | = | |
| Laundry (Top loader) | | X | 40 gallons | = | |
| Laundry (Front loader) | | X | 20 gallons | = | |
| Car Wash (water running) | | X | 150 gallons | = | |
| Car Wash (water shut off) | | X | 40 gallons | = | |
| Hand washing dishes | | X | 27 gallons | = | |
| Dish washer | | X | 4 gallons | = | |
| Leaky fixture (10 drips per minute) | | X | 1.5 gallons per day | = | |
| Watering 10'x10' lawn with 1 inch of water | | X | 62 gallons | = | |
| Total = | | | | | |

What are some ways your family can reduce its water use?
