



Where in the World is Water?

Water Science: Human Use

Appropriate Ages 8-12

Expected Time: 40 min

This activity satisfies one of the required JNMN lessons needed to complete the Junior Water Science Master Badge.

BEFORE YOU TEACH

Learning Objectives:

Students will be able to describe the importance of conserving Earth's water as it relates to being a finite resource.

NE Science Standards:

Grades 5-6

SC.5.13.4.B

SC.5.13.4.D

SC.6.9.3.B

Did You Know...

The ocean holds 97% of the total water on the planet; 78% of global precipitation occurs over the ocean, and it is the source of 86% of global evaporation.

BACKGROUND KNOWLEDGE

Did you know that less than 1% of all the water on Earth can be used by people? The rest is salt water or is permanently frozen and we can't drink it, wash with it, or use it to water plants.

As our population grows, more and more people are using up this limited resource. Therefore, it is important that we use our water wisely and not waste it. Source: epa.gov

Materials And Prep:

- Table Salt
- 100mL Graduated Cylinders
- 7 Beakers
- 25 Pipettes/eye droppers
- 1 NE Water Map
- 1 Principal Aquifers Map
- Basin to hold and empty water for graduated cylinders and beakers
- 6 Aluminum pans
- Pitcher to make and pour Kool Aid

Engage: 5 min

Have students think about how they use water. In what ways do they use water every day? What uses need the most water? What ways do they use water occasionally? Brainstorm as a class and make a list of all the different ways that students and their families use water (showering, drinking, watering plants, flushing toilets, washing their dishes, sprinklers, etc...)

Explore: 10 min

Split students into six groups. Explain that all earth's water will be divided among the groups by where it can be found. Ex) One group will be water found as ice, one group will be water found in lakes, etc. Have each group fill a beaker 1/2 full with water from the basin. When finished, have them return the water into the basin. Distribute water to the groups by using the amounts below. A graduated cylinder and pipette will be used for measuring. Using the same beaker and pipette, the educator, having filled their beaker to 100 mL, shows students how just one drop is dispensed using a pipette. Make sure each group knows how much water is in each area by displaying the volumes shown below to the classroom.

VOCABULARY

Freshwater: water that is not salty, as in rivers and lakes.

Groundwater: water that is beneath the earth's surface that supplies springs and aquifers.

Wetland: areas where water covers the soil, or is present either at or near the surface of the soil all year or for varying periods of time during the year, including during the growing season.



- Ice: 20.6 mL
- Groundwater: 9.0 mL
- Lakes: .08 mL
- Wetlands: .01 mL (about 5 drops)
- Rivers: .002 mL (about 1 drop)
- Ocean: 970 mL

After giving the ocean group the remaining water, pour a large amount of salt in the water, making it undrinkable and difficult to utilize without spending energy and money to desalinate. Have students return the water in the beaker to the basin, with the exception of the salty ocean water. This beaker of saltwater should not be used again throughout the following activities. It can later be poured down a sink.

Explain: 10 min

Tell students that even though there is a large quantity of water on earth, only 3% is freshwater. What surprised them about where water can be found on Earth? How does this affect us in Nebraska? Have students think about where we get our water from locally.

Prior to this activity, fill the aluminum pan 1/3 full with red Kool Aid. No more than four students will share one pan. Using water from the original basin, have students refill each graduated cylinder half full, 125mL in a 250 mL cylinder. If using the 100mL graduated cylinders, also refill to the halfway mark at 50 mL. Pause to make sure each student has the same amount. When set, call out the number of drops each water use action equals. Have them add the drops to their graduated cylinders and tally the drops so that later they can count the number of total drops to share with their friends. Before beginning, have each student practice using the pipette by dispensing just a single drop (represents 1 gallon) into their graduated cylinder.

- Brushing teeth twice a day while leaving the water running uses 2 gallons = 2 drops
- Leaving the hose running while soaping up the car uses 7 gallons = 7 drops
- Your family runs the dishwasher once a day, that's 9 gallons = 9 drops.
- Your family washes dishes in the sink for 10 minutes with the water continuously running = 20 gallons = 20 drops OR Your family washes dishes in the sink for 10 minutes turning the water off most of the time using 10 gallons = 10 drops.
- Taking a shower for 5 minutes uses 10 gallons = 10 drops, for 10 minutes = 20 gallons, add 20 drops, for 15 minutes = that's 30 gallons = add 30 drops, for 20 minutes, that uses 40 gallons = 40 drops. Greater than 20 minutes, multiply the number of minutes used by 2, this will be the number of gallons used, and the number of drops to add to their graduated cylinder.
- Wasting part of your drinking water, from a plastic bottle, water bottle or drinking glass. Throwing out 75% of the water = 3 drops, 50% = 2 drops, 25% = 1 drop. If you had this happen more than once in a day, for each time, add the same number of drops.

Evaluate: 5 min

Have students brainstorm ways they can conserve water at home. Examples could be taking shorter showers, turning the water off when brushing teeth and running the washing machine when they have a full load.

Refill each beaker with ½ cup of water.

Have students discuss how they might share their water considering that water has to accommodate the needs of plants and animals as well as humans. Remind students to also think about where their water is coming from - it wouldn't be realistic to melt ice in the Arctic and for use in Nebraska. Display the NE Water Map and have students relate their ideas by identifying the different sources of water. Draw the classroom's attention to the Platte and Missouri Rivers that provide some of the state's municipal drinking water. As discussed before, Nebraska has rivers and lakes, but also groundwater and wetlands. Interpret the Principal Aquifers Map as the large water storage unit beneath Nebraska. This groundwater is a valuable economic resource as it's a farmers' source for irrigation water and in many cases, also for drinking water.

Hands On Extension

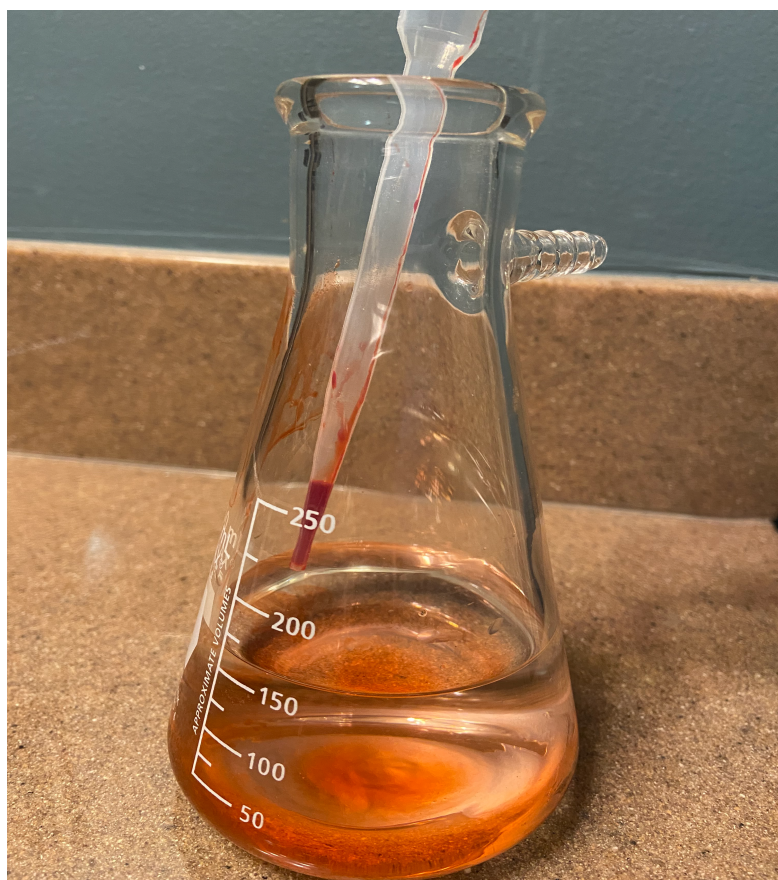
In the Lab: Classroom Experiment

Basin Balancer <https://mobb.usace.army.mil/HOME/MAIN> Students try their hand at how to balance the water needs of people using the game "Basin Balancer". Great graphics and strategic thinking will keep students engaged.

In the Community: Have students estimate the amount of water needed by the population within their community (town, city, or county). Have students estimate the number of gallons listed above for routine individual water use. Next students will need to identify the population of their community and quantify the volume of water needed to meet the daily use needs of the community population. Now compare that with the total water use given to you by calling and speaking with the water representative for your community or nearest municipality, and see if it is close to the students' estimates.

In the Lab Activity 2: Test Your WaterSense Game <https://www.epa.gov/watersense/watersense-kids>

*COMPLETING ANY ACTIVITY FROM THIS SECTION WILL COUNT AS YOUR SECOND ACTIVITY REQUIREMENT FOR THE WATER SCIENCE MASTER BADGE.



WATER USAGE DATA SHEET

Fill in the number of drops that equals the amount of water you use below

- 1 _____ Brushing teeth twice a day while leaving the water running uses 2 gallons = 2 drops
- 2 _____ Leaving the hose running while soaping up the car uses 7 gallons = 7 drops
- 3 _____ Your family runs the dishwasher once a day, that's 9 gallons = 9 drops.
- 4 _____ Your family washes dishes in the sink for 10 minutes with the water continuously running = 20 gallons = 20 drops OR Your family washes dishes in the sink for 10 minutes turning the water off most of the time uses 10 gallons = 10 drops.
- 5 _____ Taking a shower for 5 minutes uses 10 gallons = 10 drops, for 10 minutes = 20 gallons, add 20 drops, for 15 minutes = that's 30 gallons = add 30 drops, for 20 minutes, that uses 40 gallons = 40 drops. Greater than 20 minutes, multiply the number of minutes used by 2, this will be the number of gallons used, and the number of drops to add to their graduated cylinder.
- 6 _____ Wasting part of your drinking water, from a plastic bottle, water bottle or drinking glass. Throwing out 75% of the water = 3 drops, 50% = 2 drops, 25% = 1 drop. If you had this happen more than once in a day, for each time, add the same number of drops.

Total gallons used:
