

ROBERSON MUSEUM AND SCIENCE CENTER

Pre-Visit River Quest

Grade Level: 4 through 12

New York State Standards: MS & T 1, 3, 4, and 6

Pennsylvania State Learning Standards: S & T 3.2, 3.3, 3.5, 3.7, and 3.8

Objectives: Before gaining an understanding of the importance of our local watershed and water quality in the “River Quest” program at Roberson Museum and Science Center, students engage in an experiment that will exemplify the problem of water conservation. Students will test their own habits of water use; showering and brushing their teeth, and they will also answer some questions related to water trivia. Students will have a chance to reduce the amount of water they use on a daily basis, in order to make an individual contribution to a world-wide problem of drought. At the conclusion of this activity, the students will gain an understanding that if each of us does our part, small though it may seem, a huge difference is made in the end. This will hopefully add to the importance of the theme of “not in my back yard” that is so prevalent when speaking of watersheds and water quality.

Materials:

- Activity Sheet
- Pencil
- Calculator
- Watch with a second hand
- Measuring Cup

Procedure:

1. Discuss with students that the average person spends approximately twenty minutes in the shower, seven days a week, and leaves the water running while they brush their teeth. Most people are not aware of the excessive amount of water that they are using and the amount of water they could save on a daily basis.
2. Tell the students they will begin an experiment in which they will measure the amount of water that comes out of their sink faucet and out of their showerhead at home in one minute. This will be done by placing a bucket under the faucet or showerhead and then turning on the water and timing it for one minute. The water will then be measured using

a measuring cup and the amount of water dispensed per minute can then be calculated. Students may ask for help at home to obtain this measurement.

3. Each student will then be asked to time themselves when they shower and they will be asked the approximate number of showers they take per week.
4. Each student will also be asked the amount of time it takes to brush their teeth, the number of times they brush their teeth per week and if they leave the water on while brushing their teeth.
5. Students are asked not to alter their responses. Honesty is crucial!

6. **Calculations For Showering:**
 - a) **How many showers do you take per week? _____**
 - b) **How many minutes do you spend in each shower? _____**
 - c) **Multiply a and b together to find the total number of minutes you spend in the shower in a week.**
 - d) **Now multiply your answer to c by the amount of water your shower uses in one minute. (you found this out earlier)**
 - e) **Go back to step b and take off 3 or 4 minutes of your daily shower time and complete the rest of the steps again.**
 - f) **Subtract your second answer from your first answer to see how many gallons of water you could save.**

7. **Calculations For Brushing Your Teeth:**
 - a) **How long do you spend brushing your teeth each time? _____**
 - b) **Multiply this number by the amount of water from the faucet each minute. (You calculated this number earlier) This is the amount of water you use each time you brush your teeth.**
 - c) **Now subtract the number of minutes the water is running that you aren't using it and complete step b again. This is the amount of water you could save each time, just by turning off the water.**

8. Once the original calculations above have been made, teachers should ask the students to calculate how much water would be used if each of their showers was a minute shorter and if they turned off the water while they brush their teeth (see calculations above). This will show them how much water they are wasting each week and will let them know how easy it would be for them to help. Even though their own personal contribution would be a small one, it makes a difference if a large amount of people cut down.

Water Trivia:

1. How long can a person live without water?

Answer: (Approx. one week)

2. How much water must a person consume per day to maintain health?

Answer: (2 ½ quarts from all sources, water, food)

3. How much water is used to flush a toilet?

Answer: (1.6 -7 gallons)

4. How much water is used in the average 5 minute shower?

Answer: (12.5-50 gallons)

5. How much water does the average residence use during one year?

Answer: (107,000 gallons)

6. How much water does an individual use daily?

Answer: (123 gallons)

7. What does a person pay for water on a daily basis?

Answer: (National Average 25 Cents)

8. How much of the Earth's surface is water?

Answer: (80%)

9. How much of the Earth's water is frozen and therefore unusable?

Answer: (2%)

10 How much of the Earth's water is suitable for drinking?

\ Answer: (1%)

11. Is it possible to drink water that was part of the dinosaur era?

Answer: (yes)

12. Americans use 5,506,540 gallons of water each day for showers.
13. In developing nations, 80% of diseases are water related.
14. A birch tree gives off 70 gallons of water per day in evaporation.
15. Two gallons of water are used to brush your teeth.
16. An automatic dishwasher uses 9-12 gallons of water to wash dishes on average.
17. On average twenty gallons of water are used to hand wash dishes.
18. One gallon of water weighs 8.34 pounds.
19. 66% of the human body is water.
20. It takes 28,100 gallons of water to process one ton of cane sugar to make processed sugar.
21. Water is the only substance found on Earth naturally in three forms; solid, liquid and gas.
22. Does water regulate the Earth's temperature?
Answer: (Yes, it is an insulator)
23. One gram of PCB's makes one billion liters of water unsuitable for freshwater aquatic life.
24. One drop of oil can render up to 25 liters of water unfit for drinking.
25. There are as many as 6 million tiny floating plants, in a cubic foot of sea water.
26. The worlds's oceans contain 328 million cubic miles of sea water.
27. 39,090 gallons of water is used to make four new tires.
28. A cornfield of one acre gives off 4,000 gallons of water per day in evaporation.
29. It takes approximately one gallon of water to make a quarter pound hamburger.
30. Using recycled water (treated to almost drinkable standards) on landscaping would save the U.S. enough fresh water in a year for everyone in New York City to take a 10 minute shower every day for 4 ½ years!

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Calculations For Showering:

1. How many showers do you take per week? _____
2. How many minutes do you spend in each shower? _____
3. Multiply 1 and 2 together to find the total number of minutes you spend in the shower in a week.
4. Now multiply your answer to 3 by the amount of water your shower uses in one minute. (you found this out earlier)
5. Go back to step 2 and take off 3 or 4 minutes of your daily shower time and complete the rest of the steps again.
6. Subtract your second answer from your first answer to see how many gallons of water you could save.

Calculations For Brushing Your Teeth:

1. How long do you spend brushing your teeth each time? _____
2. Multiply this number by the amount of water from the faucet each minute. (You calculated this number earlier) This is the amount of water you use each time you brush your teeth.
3. Now subtract the number of minutes the water is running that you aren't using it and complete step b again. This is the amount of water you could save each time, just by turning off the water.