Water-Use Activities and Optional Questions

Water-Use Activities

School_____ Grade_____ Teacher_____
Your Street Address_____ Town_____

Directions:

A. Determine how much water your family uses every day. Take the total number for each fixture for each day from your **Summary Sheet** and multiply by the amount of water used by each fixture. Use **Chart of Water Use by Fixture**.

Number of times fixture was used in 1 day ***x*** *Fixture Rate = Water use for fixture activity per day.*

Chart of Water Use by Fixture

Fixture	Fixture Rate
Non low-flow toilet (old)	6 gallons per flush
Low-flow toilet (new)	3.5 gallons per flush
Ultra low-flow toilet	1.6 gallons per flush
Regular shower head	3.8 gallons per minute
Low-flow shower head	2.3 gallons per minute
Bathtub filling	3.0 gallons per minute
Clothes washer	40 gallons average load
Dish washer	15 gallons average load
Faucet	3 gallons per minute

FOR EXAMPLE: If the non low-flow (old) style toilet was flushed 12 times during Day 1, 10 times during Day 2, etc. then how much water was used daily for flushing the old-style toilet for each day of the week?
12 flushes for Day 1 X 6 gallons per flush =72 gallons per day
10 flushes for Day 2 X 6 gallons per flush = 60 gallons per day

B. Enter the calculated daily use for each activity and fixture from *Step A*. into the attached **Water-Use Worksheet** for each day. Add up all the uses by fixture to obtain the total amount of water used for that day in your house.

Example of Water-Use Worksheet

Task	Water-use Activity	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
		gallons used						
1	Total water used for non low-flow (old) toilet flushes	**72**	**60**					
	Total water used for low-flow (new) toilet flushes							

C. Calculate your **average family daily use** for your entire data-collection period. Add up all the total daily uses and divide by the total number of days you collected data.

Sum of Family Total Daily Uses for the data-collection period ÷ total number of days you collected data = Average family daily use in gallons per day

Your **Average family daily use** is _____ gallons per day.

D. Determine **family per capita water use** or the amount of water used by a member of your family.

1. Calculate the **daily family per capita water use** for each day by dividing the total water use in the household each day by the number of people in the household. For example, if your family used 1,000 gallons on Monday, April 12 and there were 5 people in your family, then

Total daily water use, in gallons ÷ Number of people in family =
Your family's per capita water use

1,000 gallons ÷ **5** persons = **200** gallons per person per day

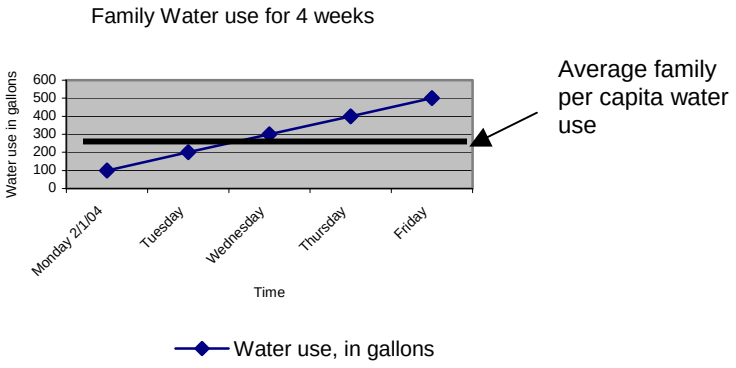
Example: Per capita water use

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
	gallons per person per day						
Total water use per number of people	**200**						

2. Calculate the **average family per capita water use** by dividing **average family daily use (*calculated in Step C*)** by the number of people in the household.

Average family daily use ÷ Number of people in the family household =
Average family per capita water use

E. Create a graph on graph paper of how your family per capita use changed over the 4 weeks. Time (days) should be on the x-axis and gallons of water on the y-axis. Draw a horizontal line across the graph to represent the **average family per capita water use**. Compare each day's per capita use with your average per capita use. Does your family's daily use differ from the family's average use? Explain why there is or isn't a difference. See example below.



F. Determine **average class per capita water use**, in gallons, by adding together the **average family per capita water use (*from Step D2.*)** for everyone in your class divided by the total number of students.

Total of class average per capita water use, in gallons ÷ Total number of students =
Average class per capita use

Water-Use Worksheet:

School_____ Grade_____ Teacher_____

Your Street Address_____Town_____

Week 1 Begin Date _____

Task	A. Water-use Activity	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
		gallons used						
1	Total water used by non low-flow (old) toilet flushes							
	Total water used by low-flow (new) toilet flushes							
	Total water used by ultra low-flow toilet flushes							
2	Total water used for clothes washing machine loads							
	Total water used for dish washing machine loads							
3	Total water used by regular (old) shower							
	Total water used by low flow (new) shower							
	Total water used filling bathtub							
4	Total water used by faucet use							
B.	**Total water use**							

D.

Per Capita Water-Use Table

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Total water use per number of people = Per capita use							

Water-Use Worksheet:

School_____ Grade_____ Teacher_____

Your Street Address_____Town_____

Week 2 Begin Date _____

Task	A. Water-use Activity	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
		gallons used						
1	Total water used by non low-flow (old) toilet flushes							
	Total water used by low-flow (new) toilet flushes							
	Total water used by ultra low-flow toilet flushes							
2	Total water used for clothes washing machine loads							
	Total water used for dish washing machine loads							
3	Total water used by regular (old) shower							
	Total water used by low flow (new) shower							
	Total water used filling bathtub							
4	Total water used by faucet use							
B.	**Total water use**							

D.

Per Capita Water-Use Table

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Total water use per number of people = Per capita use							

Water-Use Worksheet:

School_____ Grade_____ Teacher_____

Your Street Address_____Town_____

Week 3 Begin Date _____

Task	A. Water-use Activity	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
		gallons used						
1	Total water used by non low-flow (old) toilet flushes							
	Total water used by low-flow (new) toilet flushes							
	Total water used by ultra low-flow toilet flushes							
2	Total water used for clothes washing machine loads							
	Total water used for dish washing machine loads							
3	Total water used by regular (old) shower							
	Total water used by low flow (new) shower							
	Total water used filling bathtub							
4	Total water used by faucet use							
B.	**Total water use**							

D.

Per Capita Water-Use Table

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Total water use per number of people = Per capita use							

Water-Use Worksheet:

School_____ Grade_____ Teacher_____

Your Street Address_____Town_____

Week 4 Begin Date _____

Task	A. Water-use Activity	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
		gallons used						
1	Total water used by non low-flow (old) toilet flushes							
	Total water used by low-flow (new) toilet flushes							
	Total water used by ultra low-flow toilet flushes							
2	Total water used for clothes washing machine loads							
	Total water used for dish washing machine loads							
3	Total water used by regular (old) shower							
	Total water used by low flow (new) shower							
	Total water used filling bathtub							
4	Total water used by faucet use							
B.	**Total water use**							

D.

Per Capita Water-Use Table

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Total water use per number of people = Per capita use							

Optional Questions

Directions: The following activities allow you to compare the results from the **Residential Water-use Survey (on-line), Summary Sheets,** and **Water-Use Worksheets.**

1. Do attitudes about water conservation affect how much water is used in a household?
Hint: Compare answers in the "Water-Use Habits" part of the **Residential Water-Use Survey** with the **per capita water use** results from the **Water-Use Worksheets (Part D)**.

2. What is the average **per capita water use** for each housing type?
Housing types are found on the first part of the **Residential Water-Use Survey.** The choices are:

Single family house (1-4 bedrooms)
Single family house (5+ bedrooms)
Single family house with shared walls between units (townhouse or townhouse-style condominium)
Two-family house
Mobile home
Apartment or apartment-style condominium

Water Meter Reading Activities

3. If your house has a water meter, see if you can read it. Some meters are easy to read while others are very complicated. Most meters will have notation for whether the meter measures in "cf" (cubic feet) or "gal" (gallons). There will also be notation for whether the meter reads in multiples of 10, 100, or 1,000 (The notation may look like this: "x10," "x100", or "x1000"). If the meter measures in cubic feet, convert the number on the meter dial to gallons (multiply the number of cubic feet by 7.48 to get gallons your household uses). You will need to calculate all your Water-use values in gallons.

A. If the meter shows that it measures in multiples of 10 or 100 gallons (x10" or x100), write down the meter reading once a day at the same time (preferably first thing in the morning or last thing at night).

B. If the meter shows that it measures in multiples of 1,000 (x1000), then you only need to check the meter once a week.

C. The difference between the new reading and the old reading from the previous day or week is how much water was used. Remember to multiply the meter reading by the correct multiple. For example, if on the first day the meter showed 4567, and the second day 4573, the multiple on the meter was "x100", and your unit of measurement was gallons, the computation to determine daily water use of your family would be:

(Second meter reading) (4573 x 100) = 457,300
(First meter reading) *–(4567 x 100) =* *456,700*
(Family daily water use) 600 gallons

D. Compare each of the volumes of water used according to the meter with your estimate of household water used daily or weekly.

E. How different were the values you calculated from the meter readings? Why?

F. Why might the water delivered to the house be higher than the amount you calculated?

"Your Community Water System" Activities

Directions: These activities can be coordinated to Bruce Montville's talk about community water systems when he visits your classroom.

4. If your house is on municipal water supply, draw on a map where the community gets its water, where the water towers are, where your house is. (You can use a copy of the DeLorme's New Hampshire Atlas and Gazetteer, Arrow's Street Atlas for Southern New Hampshire, or a USGS topographic map.)

5. If your house is on a sewer system, draw on the same map where the wastewater treatment plant is, and where the treated wastewater is discharged.

6. Look at a watershed map for your town and the surrounding areas. Usually, water is withdrawn from rivers or wells, used, and returned to streams inside the same watershed.

G. Are the wells or surface-water bodies supplying your community water system in a different watershed than your house? **If yes**, then this type of water system is called an **interbasin transfer.**

H. Is the wastewater treatment plant in a different watershed than your house? **If yes**, then this wastewater system is also called an **interbasin transfer**. Water flows from the watershed divide or "rim" of the watershed to the outlet of a river draining the watershed.

- Is your community water supply near the watershed divide (rim) or the outlet?
- Is your community wastewater system discharge near the watershed divide (rim) or the outlet?
- If your family uses a ground-water well and a septic tank in the yard, is your household well closer to the watershed divide (rim) or to the outlet than your septic tank? Which do you think would be better location for your well and/or septic tank and why?

7. Visit the USGS Web site and find the water-use page in the Seacoast ground-water resources project. Examine the water-use cycle figure shown on this Web site.

http://nh.water.usgs.gov/CurrentProjects/seacoast/images/wu_cycle.gif

I. What boxes in the **water-use cycle** are involved in your household water use? Make a similar drawing that shows **only** those boxes in the **water-use cycle** that are involved in your household water use?

J. Discuss your drawing with your class.

Optional Questions Teacher Answer Sheet

The following answers and comments relate to the corresponding questions that ask students to compare the results from the *Residential Water-use Survey* (on-line), *Summary Sheets*, and *Water-Use Worksheets*.

1. It would be expected that per capita use is lower in families who try to conserve water.

2. Water use in the larger houses is expected to be higher than water use in the smaller houses.

Water Meter Reading Activities

3. Meters on houses are all different so an example of a meter was not included in this question. The questions themselves include the instructions for calculating water use from any type of meter.

Why might the water delivered to the house be higher than the amount you calculated? **ANSWER:** The reasons why a higher amount of water might be delivered to a house than was calculated may include any or all of the following: (1) leaky faucets, running toilets, and leaky pipes lose water, (2) the rates assumed for each fixture might be incorrect; for example, the toilet you think flows at 3.8 gallons per flush actually uses 5 gallons per flush; and (3) not all uses in the house were actually recorded by the student.

"Your Community Water System" Activities

Directions: These activities can be coordinated to Bruce Montville's talk about community water systems when he visits your classroom.

Background information: It is better to have your water supply closer to the watershed divide (which can be described as a rim of the watershed) or "upstream" in the watershed rather than where your wastewater is discharged so that you don't drink your own wastewater. If students live close together, then a source of water may be "downstream" from a neighbor's septic tank. This is one reason why planning or zoning commissions want larger lot sizes to make sure there is enough distance between your drinking water well and your neighbor's septic system.

Community water systems provide water that meets drinking water standards so you do not have to worry about whether your well is safe from contamination. But, even community water systems have to know where the water supply is located and deal with the "upstream" communities' wastewater discharges. If a community wastewater system follows or complies with wastewater discharge standards, there will not be a problem downstream. In fact, the discharged wastewater is important for maintaining flow within many streams to support aquatic life.