

Professor Diana Pacin-de Gongora
MAT0018 DEVELOPMENTAL MATH1
EXTRA CREDIT ASSIGNMENT

**USING RATIOS, PROPORTIONS AND DECIMAL NUMBERS TO SOLVE
WATER CONSERVATION AND MONEY SAVING PROBLEMS**

Objectives:

1. Work with Place Value System. Rounding Decimal, Whole Numbers and Money Amounts.
2. Write numbers in Standard Form and with Words
3. Problem solving using Rates and Proportions.
4. Solve problems using U.S. Units of Capacity.
5. Learn about current water resource crisis in Florida.
6. Explore ways to use less water in Miami-Dade County, while maintaining quality of life.
7. Gain awareness about the very high price of bottle water and the economic and social issues regarding the extraction and bottling of water.
8. Access MDC's Earth Ethics Institute resources to learn about Earth Literacy and Sustainability.

In the attached article "Our Water. Our Florida. *A Water Ethic for Florida*", from OurFloridaOurFuture.org, Cynthia Barnett states that Florida residents, on the average, use 158 gallons of water, per person, daily.

WATER USAGE IN FLORIDA

- 1) According to www.google.com, the population in Florida, on July 2009, was 18.583 million people.
 - a) Use this number and the information on the attached article to estimate the number of gallons of water used in Florida, daily.
 - b) Use power of 10 multiplication to express your answer in standard form.

- c) Write the word name of the number in part b).
- d) A typical residential pool (40'x20'x7.5') holds 33,000 gallons of water. How many pools could be filled with the amount of water in part b)? Round your answer to the nearest "whole pool".

RESIDENTIAL WATER CONSUMPTION CALCULATION

- 2) Find the water consumption for two residences in Miami-Dade County for which you have access to their water bill and know the number of residents in each. (Don't need to reveal the source).
 - a) Write a unit rate for each to compare gallons/person, daily. Round your answer to the nearest tenth of a gallon.
 - b) Use <, = or > to compare these unit rates to the average for Florida given in the attached article.

WATER CONSERVATION IN MIAMI DADE COUNTY

- 3) Miami Dade GREEN is our county's Water Conservation Task Force (<http://green.miamidade.gov/water.htm>). Among the various programs that offer rebates to county residents for participating in water conservation, is the "WaterSense-labeled plumbing products" program (<http://www.miamidade.gov/conservation/>), which offers rebates for changing toilets, showerhead and faucets among other plumbing products, for water efficient models, thus conserving water, energy and money.

A typical toilet installed between 1980 and 1992 would consume 3.5 gpf (gallons per flush) and the average daily number of "flushes" per person is estimated to be 6. Given these numbers find the following:

- a) How many gallons of water can a family of 4 save daily, if the typical 3.5 gpf toilet is exchanged for a WaterSense high efficiency toilet (HET) that only uses 1.28 gpf?

- b) The county charges \$0.006 per gallon of potable water. How much will this family save in a month (30 days)? Round your answer to the nearest one-cent.
- c) Now imagine that this family would flush their toilets with bottled water. A 16.9-ounce bottle costs \$1.00 (\$0.059/ounce or \$7.57 per gallon), since there are 128 fluid ounces in 1 US gallon. How much money will this family save in a month? Compare the numbers.

Are we overpaying for bottled water? For information regarding the devastating toll on our environment and communities around the world caused by the “manufacturing” of bottle water, I invite to watch the movie FLOW, which clearly expounds about this topic. You can find it at: <http://www.flowthefilm.com/> or <http://www.earthethicsinstitute.org/> click on resources and recommended viewing.

SOLUTIONS: Not for student distribution

1.
 - a) 2,936.114 million gallons
 - b) 2,936,114,000
 - c) Two billion, nine hundred thirty-six million, one hundred fourteen thousand

2. Answers may vary, but for a residence that uses 9724 gallons in 93 days, 2 people it would be 52.3 gal/per daily
and when comparing 52.3 gal/per < 158 gal/per

3.
 - a) Daily gallons of water saved is 53.28 gallons
 - b) Amount of money saved in 30 days is \$9.49
 - c) Amount of money saved "if flushing toilets with bottled water" is \$12,100