INVESTIGATION

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# Water Loss Drop *by* Drop

Quantitative

## PURPOSE

- Estimate household water loss from common leaks
- Extrapolate water loss to the surrounding community

## INTRODUCTION

Leaks in water lines waste an extremely valuable and diminishing resource. New York City's Department of Environmental Protection estimates that leaks make up about 10% of the water demand of the city. In the last 15 years New York City has examined 31 million feet (5,871 mi) of the 33.6 million feet (6,364 mi) of water mains and eliminated 89 million gallons/day in leaks. The Boston Water and Sewer Commission surveyed 819 miles of its 1,182 miles of water distribution mains and fixed 427 leaks out of 444 leaks found, saving 7.16 million gallons/day.

Water losses in the developing world are more severe. In Iran in 1997, for example, 30% of the 3.8 billion cubic meters (1 trillion gallons) of treated water for the public was lost. This loss took place in a desert country with a population growing at an annual rate of 1.75%.

It might seem that with such large-scale losses in distribution systems, little domestic leaks are of little consequence. This exercise will show that when minor events occur often and long enough they result in large effects.

### Problem

Determine the number of people living in your community or county. Assume the average household size is four people and there are approximately five water sources (faucets and toilets) in each household. Assume that two of the faucets leak at the rate of 1 drop/sec.

Problems

Always show your set-up and work.
Use proper labels.

**1.** Calculate the volume of water lost by each household annually. Here are some useful equivalences. Explain any other assumptions you make.

20 drops = 1 milliliter  3.78 liters = 1 gal  1 gal = 0.133 $ft^3$

**2a.** What is the total water loss in your community or county?

**b.** What percent of the total water consumption does that community loss represent? Assume a typical person uses 95 gal of water per day, on average.

**3.** Make an analogy to illustrate how much such a water loss really amounts to. The analogy should be an indication of the total volume.

**4.** Describe 10 actions you could take in your own home to conserve water. Estimate what percent of your total household consumption your savings represent.