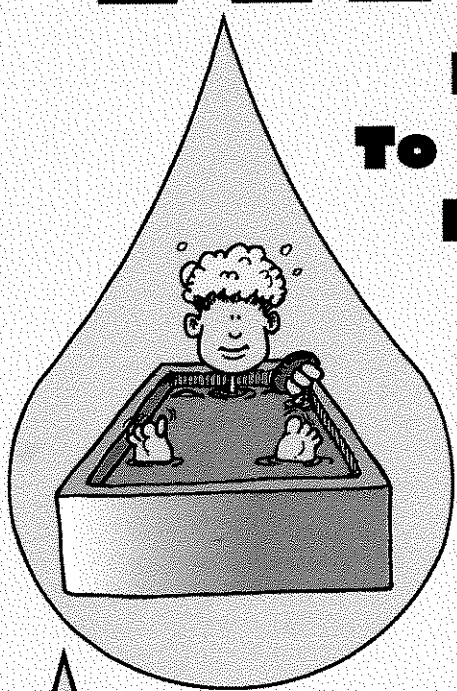
WATER

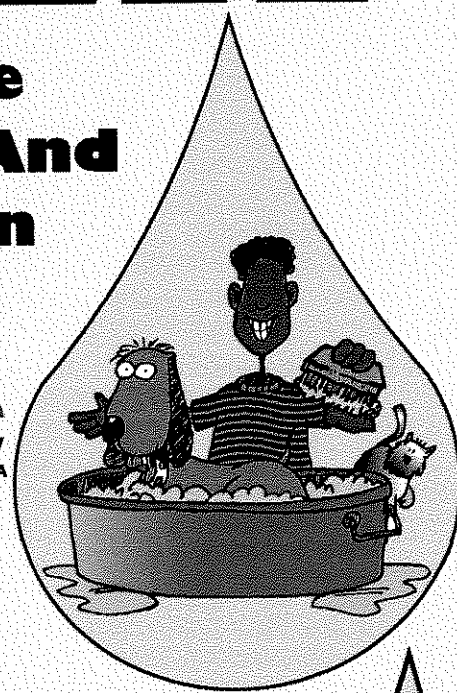
From Here To Eternity And Back Again

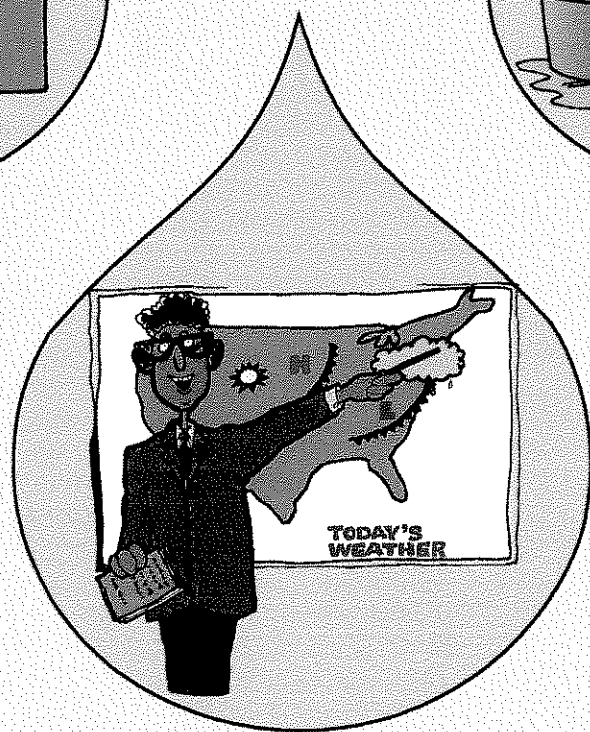
RWA

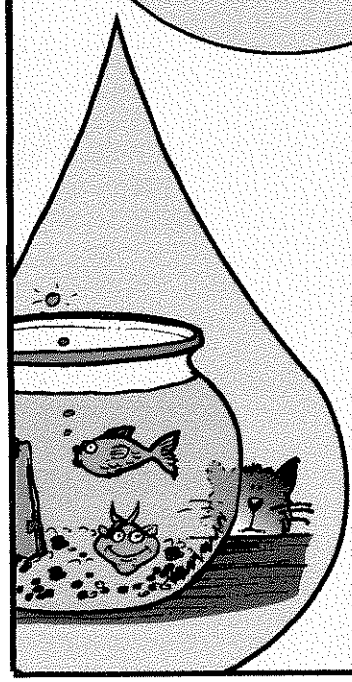
Regional Water Authority

BUILDING ALLIANCES IN NORTHERN CALIFORNIA









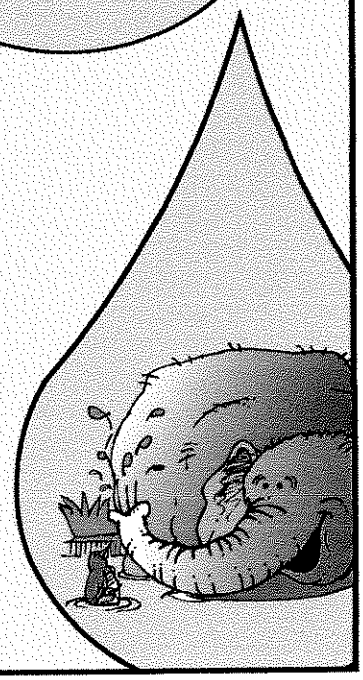


Table of Contents

Discussion questions:

1. When you fill in the quote from Ben Franklin, read it aloud as a class. Discuss what you think Ben meant.
2. Ben might simply have been saying something important about water. But he might have meant the saying to be about much more than water. Have you ever really missed something because you took it for granted and were not very careful with it?
3. Can you find a news story in today's newspaper that Ben Franklin might have used this quote for — a story that might not even have anything to do with water?
4. Look up "metaphor" in a classroom dictionary. Can this quote be a metaphor?

Dive Into Water

Every single living thing on planet Earth, from the smallest amoeba to the largest blue whale, depends directly upon water for its survival.

And so do we.

Think of all the different ways we humans use water every day: for drinking, for cooking, for bathing. Imagine what your life would be like if one day you turned on a faucet in your home — and nothing flowed out.

That's already happening in some parts of the world today. In Sudan and Somalia, two countries in eastern Africa, people don't have enough food to eat, largely because there has been too little rain to grow crops. In the Middle East, the Jordan River forms the border between Israel and Jordan — two countries that, together, will soon want to take more water from the river than flows through it. Many people are worried that peace in the Middle East is endangered by the coming fights over water.

There are problems with the drinking water supply in many parts of America, too, from Camden, New Jersey to Phoenix, Arizona. California endured a brutal drought from 1987 to 1993, when laws were passed making it illegal to fill a swimming pool or water a lawn during the day. The level of water in Florida's wells is falling as a growing population demands more and more water.

Clearly, we need to think about conserving water so that all people have enough. But we also need to think about how we can better share our fresh water with the trout, bears, bats, trees, wildflowers and other living things that need water to survive.

In the pages ahead, you'll dive into an ocean of water activities. You'll learn about the different ways you use water every day, you'll find out what brings water into your faucet, and you'll discover what happens to water when it leaves your house through your sink's drain.

So come on in, the water's fine. Start with the "Take a Guess" quiz on the next page, and follow your teacher's instructions.

Ben's Mystery Quote

Ben Franklin, a writer of the Declaration of Independence, a pioneer in the science of electricity, and the founder of a Philadelphia newspaper, had some wise thoughts on many things, including water.

Below are a series of blanks. Your mission is to fill in the blanks using numbered letters that appear throughout these pages. Find a clue, answer the question, and use the numbered letters to fill in the blanks below. When you're done, you can read Ben's most famous statement about water.

" _1_ _2_ _3_ _4_ _5_ H _6_ _7_

_8_ _9_ _10_ _11_, _12_ _13_ _14_ _15_,

_16_ _17_ _18_ _19_ _20_ _21_ _22_ _23_ _24_

_25_ _26_ _27_ _28_ _29_ _30_ _31_ _32_

_33_ _34_ _35_ _36_ _37_ _38_ _39_."

Take A Guess

Before you begin learning about the world's water, try taking this quiz. Read each question, and circle what you think the correct answer is. And don't worry — you are not expected to know the answers.

1.
Most of the Earth's fresh water is contained in which of these places?

a. the ocean

b. the atmosphere

c. deep underground

d. the polar ice caps

2.
In your home, which of the following uses the most water?

a. the kitchen faucet

b. the ice maker

c. the toilet

d. the bathtub/shower

3.
When Tyrannosaurus rex lived millions of years ago, how much water was available on Earth?

a. Much more than today

b. The same amount as today

c. Much less than today

4.
Which of the following is the source of water for your school's water fountain?

a. a reservoir

b. a river

c. a well

d. I don't know

5.
Water is used to make which of the following items?

a. hamburgers

b. tomatoes

c. cars

d. aluminum cans

e. computers

f. all of these

6.
If you were to drill straight down into the rock beneath your feet — right where you now sit! — you would eventually find water.

a. that's just crazy and not true

b. that's true depending on where you live in the U.S.

c. that's absolutely true for anywhere you live

7.
Many major American cities, from Boston to Sacramento, are built on the banks of rivers. That's because the rivers have provided us with which of the following:

a. a source of food

b. a source of drinking water

c. a method of transporting goods and supplies

d. a source of hydro-electric energy

e. a source of water for factories and mills

f. all of the above

You'll learn the right answers to each of these questions in the pages ahead. When you've finished this supplement, take the test again. Do any of your answers change?

The World's Water

Read the following true account of water. Fill in the blanks using the words provided in the box on this page. One word will not be needed. That word can be used to answer Clue #1!

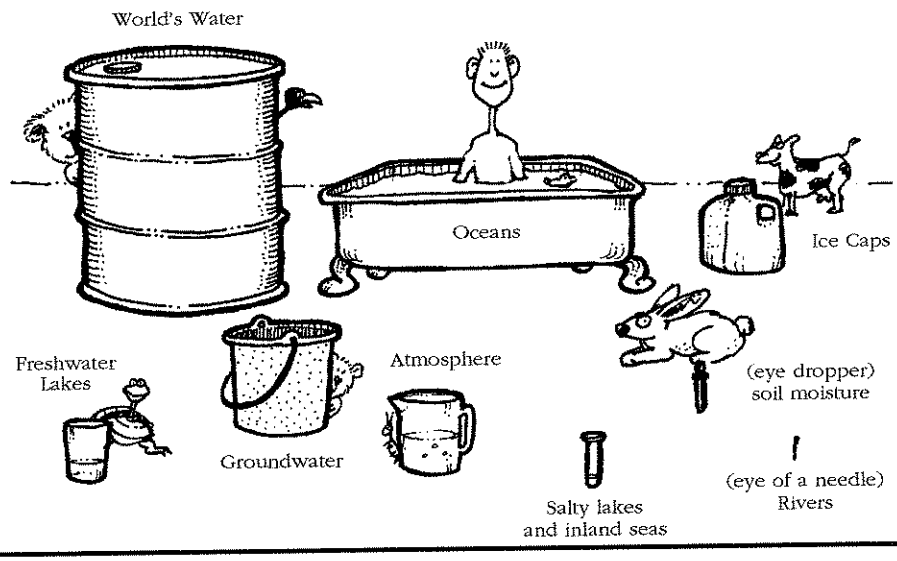
Imagine if you were to measure all the water everywhere on planet Earth: in the oceans, in rivers, lakes and streams, in swamps and _____, in the atmosphere, underground, and even in the ice caps at the north and south _____. If you did, you would discover that the Earth's water supply was a whopping 400 billion billion gallons (that's a 4 followed by 20 zeroes). Sounds like a lot, doesn't it?

But nearly all of the Earth's water — a full 97% of it — is salt water stored in the _____. So only 3% of the world's water is _____ — and two-thirds of all fresh water is locked away as _____ in the Arctic Ocean and on the continent of _____.

That leaves a tiny 1% of the world's water available as drinking water. But much of that is water vapor stored in the sky as humidity or contained in _____. And another chunk of the world's water is too deep underground for _____ to reach.

Then we come to lakes and rivers. Consider the importance of rivers to humankind. Most early civilizations grew up on the banks of rivers. Our ancestors used rivers as _____ for transportation, as a source of clean _____ water, as a source of fish for _____, and even as a place to build dams for _____. Yet only 0.0001% of the Earth's water supply flows in rivers! And only 0.009% is in lakes.

The illustration below shows how the world's water supply would be portioned out if all the water were placed in a 55 gallon drum. How much water flows through rivers. Are you surprised?



Clue #1

Though this tree often seems to be "weeping," it's happiest when it's growing in lowlands with its roots close to the banks of rivers, streams, and creeks.

___	___	___	___	___	___	___
16		10	19		35	

ocean
clouds
wells
highways
willow
Antarctica
food
power
fresh
ice
wetlands
poles
drinking

The Water Cycle

It Just Keeps Going and Going...

Right now, rivers like the Mississippi and Sacramento are dumping billions of gallons of fresh water into the ocean. Yet oceans never fill up, rivers always have new water to bring to the ocean, and your faucet never runs out.

How is this possible? The Earth's limited supply of 400 billion billion gallons constantly moves through the sky, sea and land in a process called the water cycle.

On this page is an illustration of the water cycle. Work in teams of two or three to compete the following activity.

1. Use classroom or library resources to write a definition for each of the words listed to the right.
2. Each numbered arrow in the water cycle illustration identifies one of the words you have defined. Write the correct number next to each of the words. Can you match every word to its proper arrow?

#___*Evaporation:*_____

#___*Condensation:*_____

#___*Precipitation:*_____

#___*Transpiration:*_____

#___*Percolation:*_____

#___*Runoff:*_____

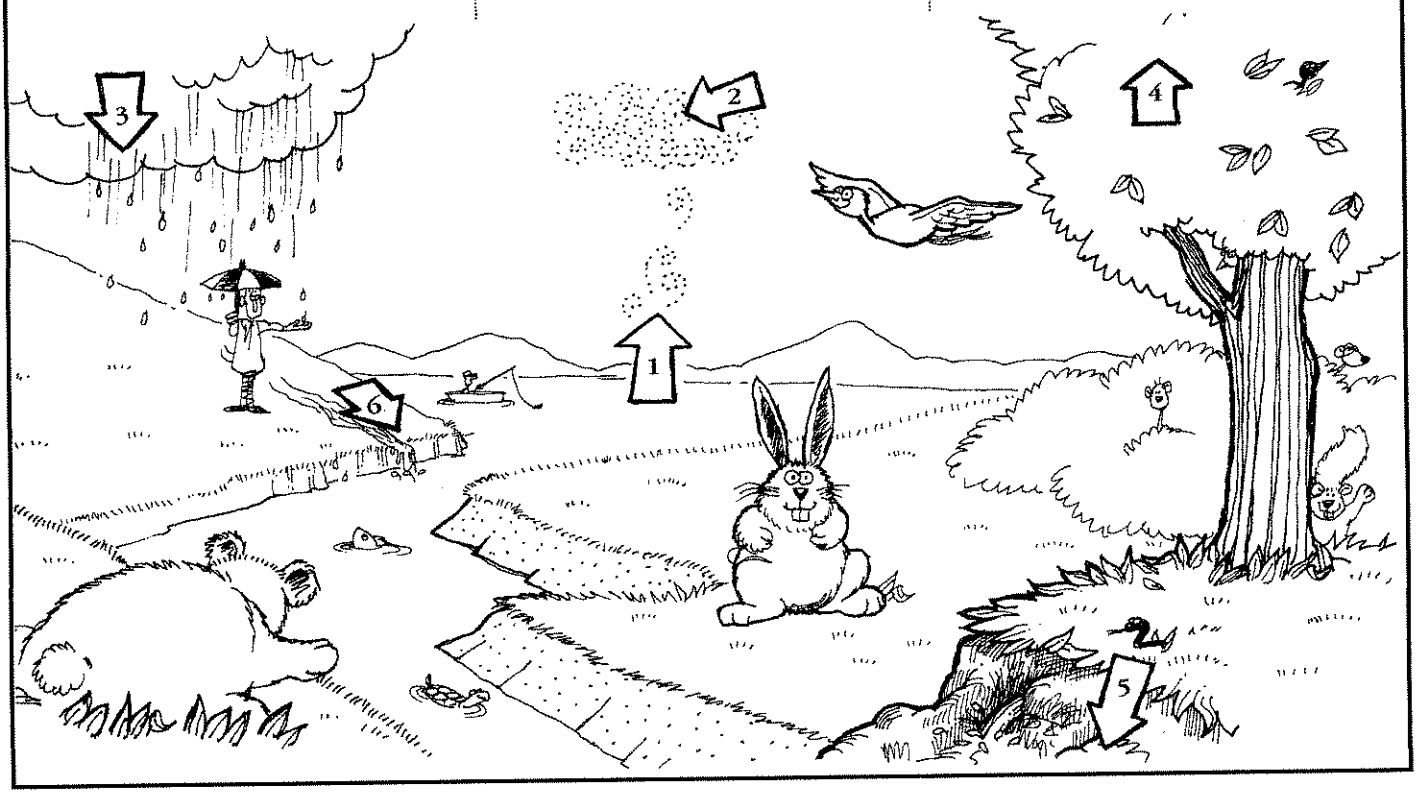
Clue #2

"Precipitation" is when water falls from clouds to the ground. Precipitation comes in several forms: rain, sleet, snow and this:

___ ___ ___ ___
26 11

Discussion questions:

1. Could that be the Pacific Ocean raining on your school? How? Where does rain come from?
2. Is your house part of the water cycle? Does water flow into your house? Where does it come from? Does water flow out? Where does it go?
3. Water needs energy to evaporate. What's the source of energy for evaporation? Does water still evaporate on cloudy days? What happens to the salt in the ocean when ocean water evaporates?

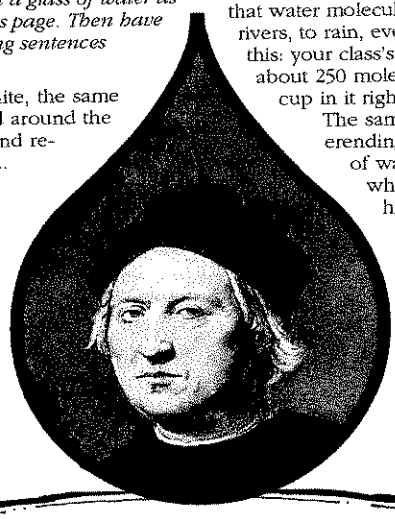


A Toast to Columbus!

(Note to the teacher: Get a glass of water as a prop before you start this page. Then have students take turns reading sentences aloud.)

The world's water is finite, the same water flowing around and around the water cycle, being used and re-used, cycled and recycled.

Imagine if Christopher Columbus, the famed explorer who sailed to American shores in 1492, had brought with him a glass of fresh water. Imagine if—halfway across the Atlantic Ocean— he toasted his adventures, and poured that water overboard into the sea.



Where would that water have gone? Some of it settled into the sea. Some of it evaporated into the air. Some of it was taken into seaweed, and then eaten by a crab, which was eaten by an octopus.

A scientist recently figured out that if the water cycle was able to evenly distribute all of Columbus's water around the world, so that water molecules went to the ice caps, to rivers, to rain, everywhere, then imagine this: your class's glass of water will have about 250 molecules from Columbus's cup in it right now!

The same water flows as a "neverending story." Here's our glass of water, and a special list of where some of the molecules have been during the last 4 ½ billion years. Where else do you think these molecules have travelled? Write your own list on the lines at right.

All the water inside has been in many places. One part erupted out of a volcano. Another was water drunk by a Tyrannosaurus rex. Some of this water was a skunk's spray 100 years ago. A penguin paddled through one part. Another part was a saber-toothed tiger's blood. Part is some caveman sweat. Another part was a downpour in a rain forest. One part was flowing in a nearby stream only 10 days ago.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Clue #3

The City of Pittsburgh is built where the Allegheny and Monongahela Rivers meet to form this major American river.

The $\frac{\_\_}{23}$ $\frac{\_\_}{32}$ $\frac{\_1\_}{}$ $\frac{\_\_}{33}$ River

The Neverending Story

Since water's travels truly are a "neverending story," here's your assignment. Write a story that begins, "Once upon a rainstorm, a drop of water fell from the sky." Use that as your first sentence, and continue the story. Can you get your drop of water into at least six different places or things? End your story with this line: "And the drop of water was part of a rainstorm again." How can you get your drop back into the clouds?

(Note to the teacher: This is an especially good activity for a rainy day.)

The Big Question

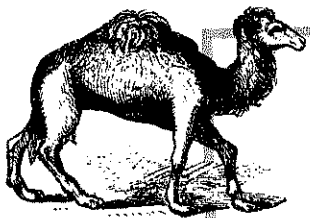
Wait a minute! If the Earth's water supply has always been 400 billion billion gallons, then the Earth's water supply will always be 400 billion billion gallons. And since we use the same water over and over again, we don't have to bother saving it. Or do we?

Discuss this as a class. If the Earth's water supply flows through the water cycle endlessly, why might we still have to consider saving it?

We'll come back to this "Big Question" later.

Life Requires Water

You know that people depend on clean water for many things.
But remember: We're not the only living things that need water.
All life on Earth, from a single-celled amoeba to the giant blue whale, needs water.



1. camel

Can you match each living thing with its need for water?
Draw a line from the drawing of the creature to the proper description.

a. drinks from puddles and uses mud from puddles to hold its nest together

b. needs clean, cold fast-moving streams that attract insects it likes to eat

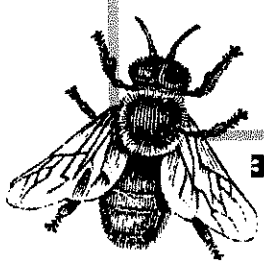
c. flies low over ponds at night, licking water as it flies

d. drinks from puddles, but also drinks water stored as nectar in flowers

e. for long trips through the desert, needs to drink lots of water that will be stored in its stomach

f. can live only in the salty water of oceans

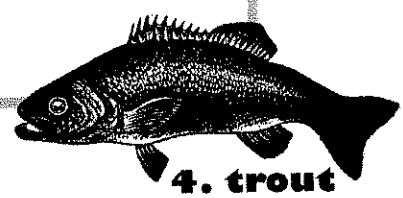
2. robin



3. honeybee

6. shark

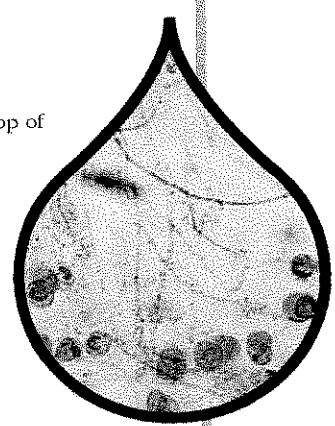
5. bat



4. trout

Just One Drop

Here's a photograph of a drop of stream water placed under a microscope. Do you see any living things? These are single-celled animals called protozoans. In nature, water is alive, filled with millions of these creatures. Would you like it if the water flowing out of your home faucet looked like this?



For more information about water online visit:

http://ga.water.usgs.gov/edu/

Photo: The Free Library of Philadelphia

Make A Water Mural

Here are five habitats made up of mostly water:

pond ***stream***
wetland ***shoreline***
open ocean

Divide your class into five groups. Each group is assigned one of these habitats, and each is challenged to create a large mural representing that habitat.

Can each group discover at least 10 species that live in their habitat? Hang your murals in the school's hallway. Give an example of habitats where you live.

The Flow From My Faucet

Water Detectives

Divide your class into teams of several students each. Each team is assigned one of the following water problems. Can your teams be detectives and figure out how to find the missing information?

1. What is the exact source of your community's drinking water?
2. What is the source of your school's drinking water?
3. Drinking water must be tested for many chemical impurities and the presence of disease-causing microbes before it's sent to your home. Can you discover *three* things your drinking water is tested for?
4. Does your water company add fluoride to the water? If yes, why? If no, why not?
5. What is the address of the treatment plant that provides water to your homes? Does it give tours to school groups?
6. How many gallons of water does your local treatment plant clean every day?

Think of all the water you've already used today. You've probably turned on a kitchen faucet for a drink of water or to make some oatmeal. You might have brushed your teeth using your bathroom's faucet. You might have taken a bath or a shower. In school, perhaps you've already drunk from a water fountain or flushed a toilet or urinal.

So much water. Do you know where this water comes from? Do you know what's done to the water to prepare for you to drink it?

All your drinking water must come from somewhere, and it's likely to be one of these sources: a river, a lake or reservoir, or an underground well. That's it. Philadelphia residents drink the Delaware River. Florida's people mostly drink wells. Milwaukee's citizens drink Lake Michigan, while Sacramento relies on the American River, Sacramento River and groundwater. All water comes from somewhere.

And it must be cleaned before it's sent to your home. Rivers and lakes are living systems, creeping and crawling with insects, fish, crustaceans, worms, bacteria, single-celled animals— and a lot more. Rivers and lakes can also be polluted with many different chemicals from factories, and rainwater flowing off roads and highways brings gasoline and motor oil dripping into water as well.

So your home and school's water is treated before it comes to your faucet. Here's a diagram of a typical water treatment plant. Follow the seven steps to clean water.

1. ***Nature and the screen.*** Water sitting in a reservoir is partially collected through the actions of nature. Sunlight and air take care of some pollutants, and heavy sediments sink to the bottom. Water is pumped in through a screen, which keeps fish, insects, sticks, and stones out of your water.
2. ***The first chemicals.*** The water is treated with a series of chemicals. Chlorine kills bacteria and living things. Alum causes chemicals to form large sticky clumps that trap pollutants. Lime assists alum. Powdered carbon (like in aquarium pumps) traps more chemical pollutants, and ammonia, if added, works with chlorine to remove bad tastes and odors.
3. ***Flash dance.*** The water is sent to a flash mixer, where vigorous mixing action allows water to interact with all the chemicals added.
4. ***Mixing.*** In the flocculator, slower mixing lets the alum and lime added earlier form solid, gooey clumps of chemicals called "floc."
5. ***Settle down.*** Floc settles out and is removed for special treatment and disposal.
6. ***Filter city.*** The water slowly filters through two feet of coal, sand, and gravel in huge concrete boxes. Chlorine is again added to prevent bacteria from building up in underground pipes after treatment. A corrosion inhibitor is also added to prevent pipes from rusting.
7. ***To your home.*** Large pumps force the water through transmission lines underneath streets and to your house.

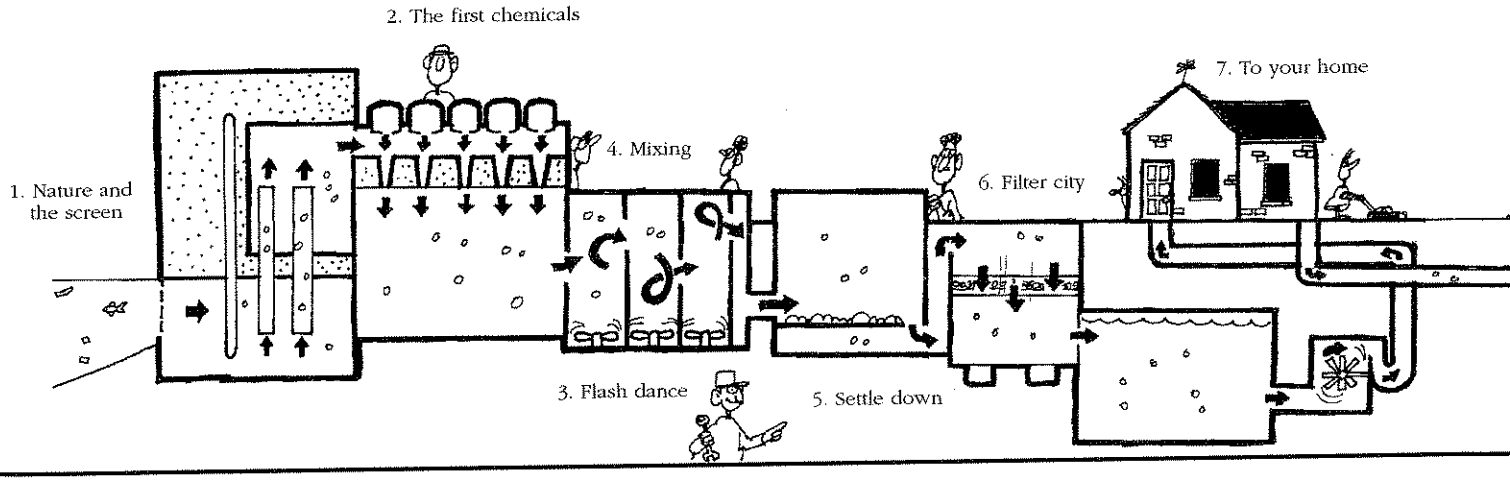
The water school is act cleaned befc described or leaves your

Most of th not used up. flows down The water y body, then e your house. most likely f *sewage treat*

For some houses goes their back y library resou work). But, treatment pl

Here's hov steps

Water Treatment



Down the Drain

The water flowing into your house and school is actually treated *twice*. First, it's cleaned before it arrives in your home, as described on page 8. Then, it's cleaned *after* it leaves your home.

Most of the water flowing into your house is not used up. Your bath and shower water flows down the drain and out of your house. The water you drink is stored inside your body, then excreted, flushed down and out of your house. All the water leaving your house most likely flows to yet another facility, the *sewage treatment plant*.

For some people, waste water leaving their houses goes into storage bins underground in their back yards called *septic tanks*. (Use your library resources to research how septic tanks work). But, most Americans enjoy sewage treatment plants.

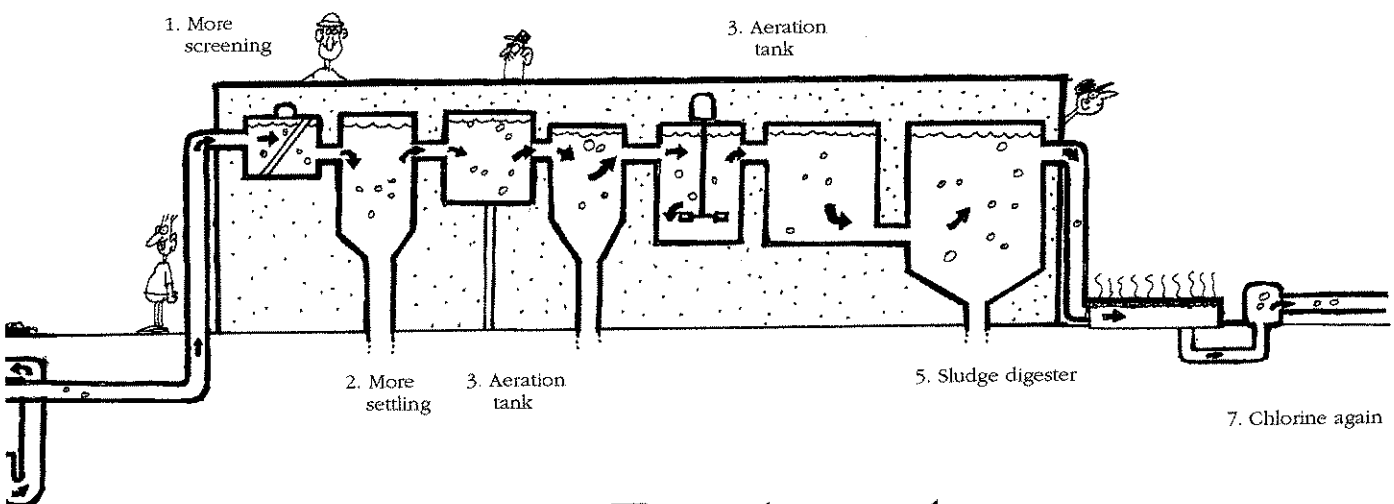
Here's how that works. Again, follow the steps

1. ***More screening.*** Screens trap large materials for easy removal.
2. ***More settling.*** Water flows first through a grit chamber and then into a sedimentation tank. More large particles fall out from the water for removal.
3. ***Aeration tank.*** Bacteria are added to the water to eat the raw sewage that leaves your home. Oxygen is added to the water to allow the bacteria to thrive.
4. ***Even more settling.*** Another tank provides a calm place for more impurities to settle out of the water.
5. ***Sludge digester.*** Another group of bacteria—a kind that hates oxygen— attacks the leftover sewage at this point, continuing to break it down into harmless by products. Sewage stays in the digester for a full 15 days, and the result is a product that looks very much like soil.
6. ***Sludge-drying.*** After the digester, the sludge lies in a drying bed, where water evaporates out. The end result is often incinerated, sometimes landfilled, and sometimes used as fertilizer. Not long ago, dried sludge was even dumped into the ocean. That practice is now illegal.
7. ***Chlorine again.*** Chlorine is added to the treated water to kill the bacteria used to eat the sludge. Then the water is sent *back* to a river, stream, or lake.

Drain Detectives

Again in small groups, solve these mysteries.

1. There are three kinds of sewage treatment: primary, secondary and tertiary. Use your school library to draw large posters of these three systems. Which of the three does the illustration on this page represent?
2. Call your water company. Which treatment does your community's sewage get: primary, secondary, and tertiary? What's the address of your community's sewage treatment plant?
3. After your community's sewage is removed and dried, what happens to it? Is it incinerated, buried in a landfill, or used as fertilizer for farms? Why did your community choose the option it did?
4. Where is the treated water sent to: which river, which stream, which lake? After it's cleaned, where does it go?



Sewage Treatment

Me and My Water

On the lines below, write a list of different ways you use water. There are 12 blanks; can you fill in each one with a different use? We got you started by completing number 1.

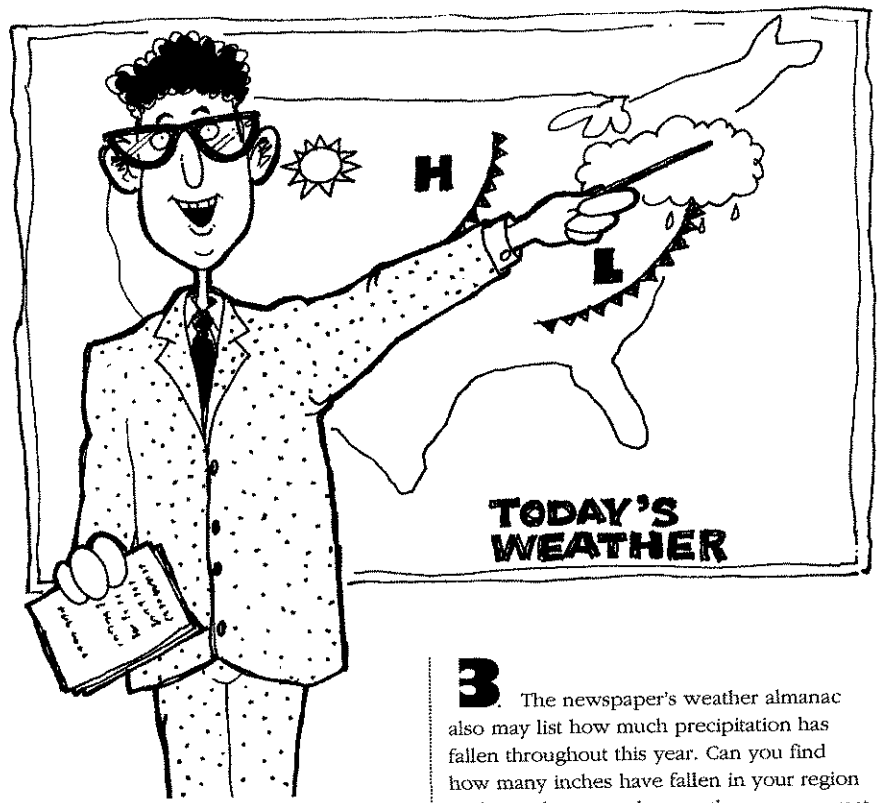
1. making ice for soda
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____

Share your list of uses aloud as a class. Can your class fill the classroom's chalkboard with every different use of water you all thought up?

Now examine your list above. Are some uses more important than others? Read your list again. Circle *the three most important* uses of water. Share your thoughts as a class as to the most important uses of water. Can your classroom as a group decide which three uses on the chalkboard are the most important?

Now draw a single line through the three uses you would consider *the least important.* Imagine if one day you were told to use less water. Could you conserve water by dropping three of these uses? Which would be the easiest to drop? Discuss your choices aloud as a class.

Water In The News



1. Look through today's newspaper. Are any of the stories about water? Read one and summarize it.

2. Find the weather report in today's newspaper. Is any rain forecasted to fall anywhere in the United States? Where will the most rain fall today?

Clue #4

The average American household uses 243 gallons of water every day. But that number can increase by 50 or even 100 gallons per day if a sink, shower or tub faucet has one of these:

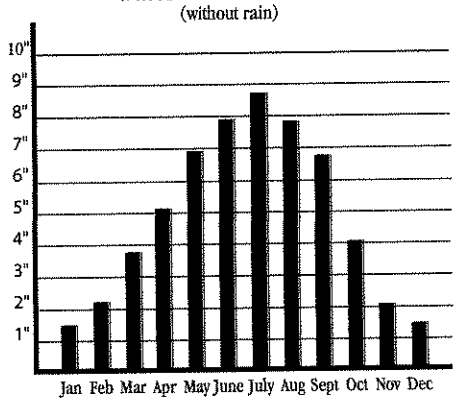
__ __ __ K

27 18

3. The newspaper's weather almanac also may list how much precipitation has fallen throughout this year. Can you find how many inches have fallen in your region so far? Is that more, less, or the same amount of water as usually falls by this date?

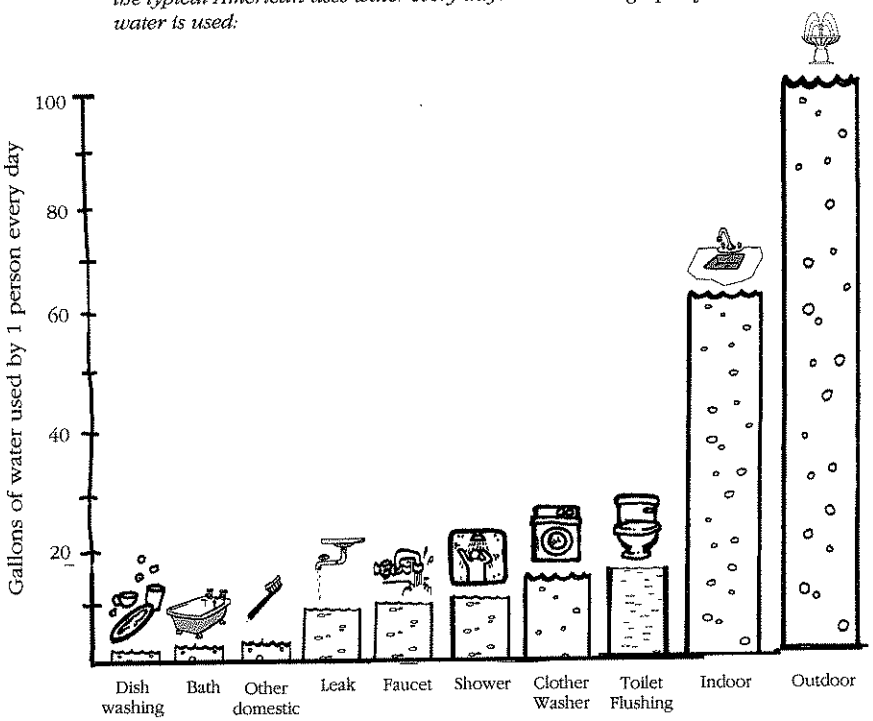
4. Look on the graph to find how much more water grass needs in July than in October.

Water Needs of Grass
(without rain)



My House's Water

The Environmental Protection Agency is the US government's protector of environmental resources like water and air. The EPA estimates how the typical American uses water every day. Here's a bar graph of how that water is used:



Use the bar graph above to fill in the correct answers to the following questions:

1. Which use of water consumes the largest amount? _____

2. Which one uses the least water?

   _____

3. How much water does doing the laundry use?

   _____

4. How much water does showering and bathing use?

   _____

5. If the family's house has a garden or lawn, it could use 100 more gallons of water per day during the summer. The amount of water used on the garden or lawn would equal the amount used for:

Clue #5

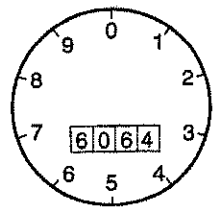
Ocean water is the home of the largest mammal of all time. This endangered giant depends on clean water to grow its food, the shrimp-like creature called krill that it eats by the millions.

___	___	A	___	___
28	2		20	17

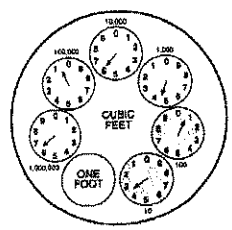
Water Math

How Do You Read a Water Meter?
If you want to track your water use more often than monthly, you can read your own meter. It may seem a little complicated, but you'll be able to do it.

Straight-Reading Meter: The straight-reading meter reads exactly like a mileage indicator on your car.



Round-Reading Meter: The round-reading meter has several small dials in a circle. Each reads like a clock, except that the hand on every other dial turns counter clockwise. To read this type of meter, just start at the right and write down the reading of each dial from right to left. (When any hand is between the numbers, always use the lower number). The "ONE FOOT" dial is the test dial to show that your meter is working.



To determine water use over time
Take two meter readings and subtract the last reading from the current reading.
To convert cubic feet into gallons
There are 748 gallons per 100 cubic feet of water. Multiply ccf by 748 to get the number of gallons used.

If your family used 150 cubic feet of water in a month, how many gallons is that? _____

Can you make up some other word problems that convert cubic feet into gallons?

The Big Picture

On page 11, you learned that the average American family of four uses 243 gallons of water per day. That's not the full story. You actually use a lot more water, in ways you never see.

Drink a can of soda, for example. The soda's main ingredient is water. And the soda's sweetener, sugar, is grown using water provided by irrigation. Manufacturing the aluminum can requires water. The mining of ore that becomes aluminum needs water. And the truck that delivers the soda to your local store runs on gasoline that requires water for its manufacture, too.

All together, one can of soda represents the use of more than *10 gallons* of water.

Water is needed to make paper. Water is used to make steel. Your electricity is provided by power plants cooled by water. This newspaper came from a tree that grew using water, and is printed from inks that combine dyes and chemicals with water.

In your house, you use about 60 or so gallons every day. But in total, each American uses more than *2,000 gallons* of water each and every day.

In the space below, make a list of every single thing you will have or have had at lunch today in school. (If needed, send one student to the cafeteria to find out everything to be served today.) Put every single thing on the list!

Next to each item, write a*t least one way* that part of your lunch required water. Does *everything* you eat need water?

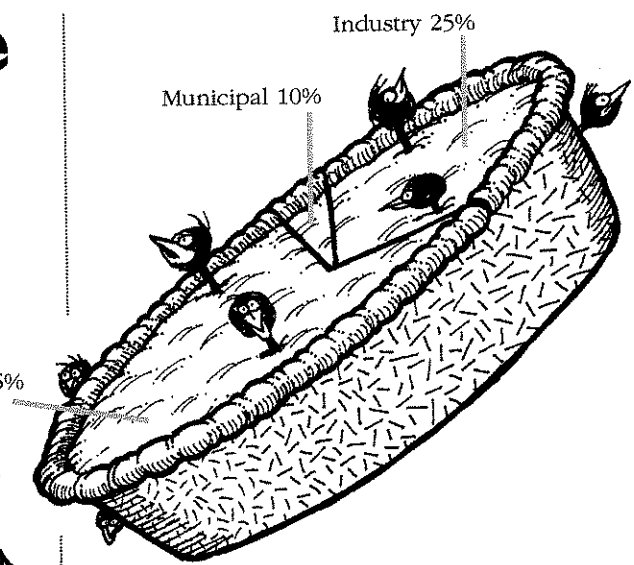
Lunch item	***How it needs water***
hot dog	beef comes from cows; cows drink water

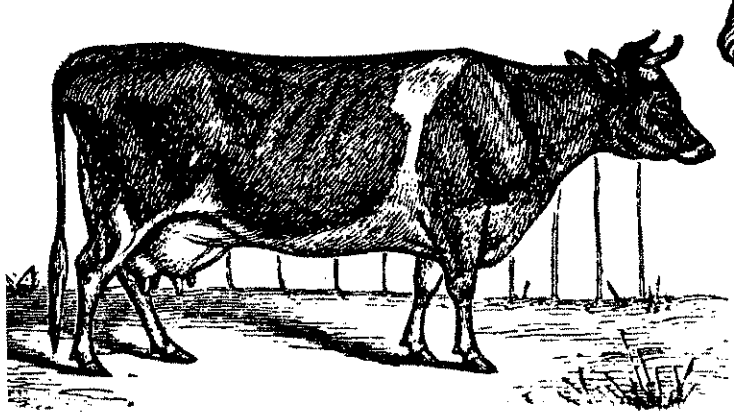
An American Pie

Look at the pie chart to the right. It shows daily water use in three parts of the U.S. economy. Have your teacher help you interpret the chart, and answer the following questions:

1. Which uses more water, farming or industry?

2. The water coming to your home and school falls under the category "municipal." Which other sectors of the economy uses more water than homes and schools?





3. Farming accounts for 65% of the water Americans consume. That's about two-thirds. Of your personal 2,000 gallons, about how many are accounted for by agriculture? *(Hint: start by dividing 2,000 gallons into thirds)*

4. The magazine Newsweek, in writing about cattle ranching, noted "the water that goes into a 1,000-pound cow would be enough to float a battleship." Can you figure out at least three ways a cow needs water? *(Think, what does a cow eat?)*

An Ocean of Problems

On page 6, we asked the "Big Question": If the same water is used endlessly, why bother conserving it? To answer that question, read the following story and fill in the blanks using words from the list on this page

The water we drink is ancient, as old as the _____ itself.

Every moment of every day, water is continuously moving through the water _____, endlessly evaporating, condensing, and _____. Yet that doesn't mean water will always be available to us. Though the entire Earth will always have 400 billion _____ gallons — in the oceans, in rivers, in the ice caps, in aquifers and in the atmosphere — the availability of water in any one location can always change. Take California, for example. For five years, that state experienced a _____, with very little rainfall, and Californians were asked to take strict _____ measures. Many New Jersey residents drink water from underground _____. What happens when water is pulled from wells faster than nature can _____ them? The wells run dry. The Colorado River is one of America's biggest, yet by the time this mighty river empties into the Gulf of California near _____, the river's flow has been reduced to a trickle, for its water is diverted to _____ crops, raising _____, and providing drinking water for cities built in _____.

Finally, _____ can make water undrinkable. Motor oil, gasoline, chemicals, fertilizers, pesticides, sewage from humans and farm animals, radioactive wastes — all of these can find their way into _____ water. Though the Earth's water supply remains constant, getting clean and cheap water to a growing worldwide _____ presents one of the next century's chief environmental concerns.

wells
pollution
drinking
Earth
recharge
cycle
precipitating
billion
irrigating
atmosphere
drought
conservation
cattle
Mexico
population
deserts

Clue #6

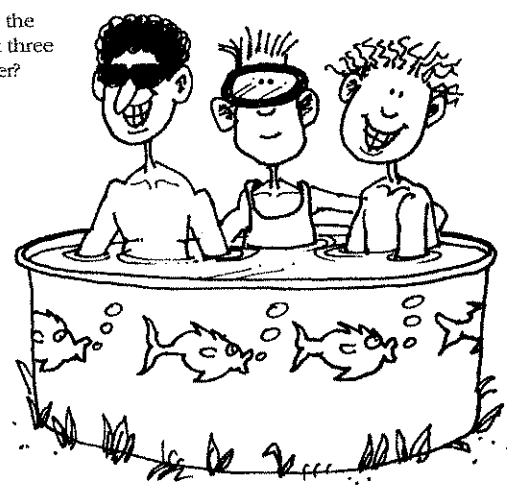
This favorite catch of sportfishers comes in several species— rainbow, brook, lake, brown. But all species share the need for pure, cold water. Its presence tells us the water is especially healthy.

___	___	___	U	___
31	30	29		37

Discussion questions:

1. This story provides several answers to the "Big Question." Can you name at least three reasons it's important to conserve water?
   _____
   _____
   _____

2. Many people drink water from wells. How does water get under ground? As water is pumped from wells, how does nature replace it? _____
   _____
   _____
   _____
   _____
   _____
   _____



Clue #7

Though this city sits at the mouth of the Hudson River, its residents drink the pure water of the Catskill Mountains, piped in from 100 miles away.

___	___	___		
22	3	1		
___		O	___	___
15			14	21
C	___	___	___	
		5		

Water, Water Everywhere

While water is everywhere— in the air around you now, under the ground beneath your feet— there are so many places around the world where lack of water is a severe problem. Read the four statements below. Each is followed by a question. On a separate sheet of paper, write a short essay that you feel answers the question for you.

1. Several countries, including Argentina, Chile, and the United States, have discussed the possibility of breaking off huge chunks of ice from the polar ice caps, and floating them to a port city for use as drinking water. Should people be allowed to "mine" the polar ice caps for water?

2. Many growing American cities — such as Phoenix, Arizona and Las Vegas, Nevada — are built in deserts, where there is little water. Water must be diverted from rivers to these cities. Should we build cities in deserts? Should the people who live in these cities be required to conserve water?

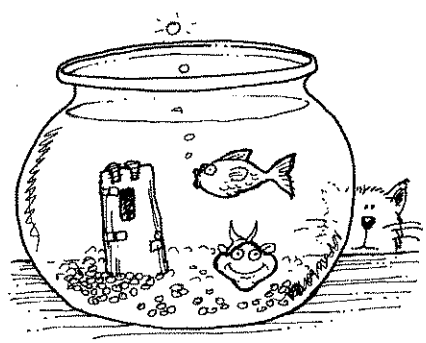
3. The Middle Eastern countries of Israel and Jordan share a common border, the Jordan River. Both countries withdraw their drinking water from that river. If water supplies dry up, will that help or hurt chances for peace in the Middle East?

4. More than one billion people live in places where they do not have access to clean drinking water. How can we help make sure all people get the water they need for survival?

Clue 8

This part of the tree is made mostly of water. And because water freezes in the winter, trees often lose these to protect themselves from winter's harsh climate.

		A	
9		34	



Clue 9

In this season, precipitation is likely to fall as snow or sleet.

	I		T		
24		4		7	39

Your Game Plan

What's the difference between conservation and efficiency? While we must use water every day, we should think carefully about how much we really need to use. Conservation reduces water use by changing our lifestyle habits. Water efficiency simply means using less water while still enjoying a precious resource. If you were asked to conserve water, which actions would you take first? Place a "1" next to that action. What would you do second? Rank that "2." If you were asked to use water efficiently, which actions would you take first? Place a "1" next to that action. What would you do second? Rank that number "2." Place numbers next to each of the actions, ranking them in order from those you would do right away, to those you would do last.

Clue #10

This habitat often borders rivers, oceans, and lakes. It provides homes for many different plants and animals: frogs, fish, turtles, alligators, ducks, muskrat, herons, and more.

___	___	___	L ___	___	N ___	___	___
8	38	25		36		13	12

Actions To Save Water

Everyday Water Efficiency Measures		Water Shortage Conservation Measures
____	Turn off water while brushing teeth.	____
____	Water the lawn or garden at night or early morning.	____
____	Fix leaky faucets, fixtures, and sprinklers.	____
____	Flush the toilet less.	____
____	Irrigate only your own gardens. Avoid runoff to the gutter, streets, or to your neighbors property.	____
____	Provide lawns and gardens only the amount of water they need for the weather.	____
____	Install low flow showerheads, aerators, and toilets.	____
____	Fix leaks and flapper valves in toilets.	____
____	Do not wash your car.	____
____	Water trees and gardens only 1/2 the time as normal.	____
____	Use a nozzle that shuts off automatically for hoses.	____

Credits

This HOT TOPICS newspaper supplement was commissioned by the Newspaper in Education (NIE) department of The Sacramento Bee.

- The writer was Mike Weilbacher, an award-winning environmental educator and free-lance science writer.
- Jeanine Reilly was the designer.
- Illustrations are by Joe Rademan.

Answer Key

Page 1: Ben's Mystery Quote
"When the well's dry, we all know the worth of water."

Page 5: The Water Cycle

1 evaporation	4 transpiration
2 condensation	5 percolation
3 precipitation	6 runoff

Page 7: Life Requires Water

1. e	3. d	5. c	
2. a	4. b	6. f	

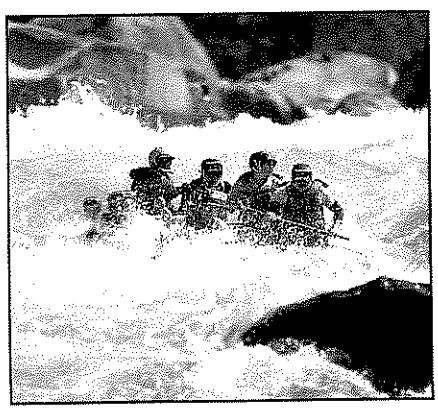
Clues:

1. Willow	6. New York City	
2. Hail	7. Trout	
3. Ohio	8. Leaf	
4. Leak	9. Winter	
5. Whale	10. Wetlands	

Wonderful Water Activities

If you've enjoyed the activities in this supplement, perhaps you and your class will consider continuing to dive in to water. Here are some more activities.

1. Divide your class into two groups. Have one build a scale model of a sewage treatment plant. Have the other build a scale model of a water treatment plant. Write your local water company for diagrams and photos of your local system; consider inviting a representative to speak to your class. Display the models in your school's lobby or hallway.
2. Read the letters to the editor in your newspaper. Write your own letter to the editor, about water efficiency.
3. Divide your class into two groups, boys and girls. Have each group create a large mural of the water cycle that is *installed in your school's restrooms!* And here's the fun part: can your mural somehow include paper pipes that lead to the sinks, toilets and urinals of the restroom? Can you create a work of art that also shows how water works?
4. Talk with your school's principal to determine if you can find out how much water your school consumes. Use the information you are given to figure out *how much each student in the school uses in one day.* Do you use more or less water at school than home? Add your school use plus your home use? What's the number? Use this new total, and go back to the Water Math questions on page 11. See what your new answers are.



5. Imagine you poured a gallon of water onto your school's lawn. After it trickles through the soil, it should emerge in a stream somewhere in your neighborhood. Use your library resources to look up the word "watershed." Can you find out what watershed you are in? What is your watershed's stream, creek or river? Is there a community organization that has adopted this stream? Invite them to come and talk about how you can help become a stream watcher.

A Letter to Me

Write yourself a letter by filling in the blanks provided.

Date: _____

Dear: _____
your name

To help conserve the world's water, from now on I am going to

_____.

I am also going to

_____.

not to mention

_____.

I am doing these things because

_____.

Yours truly,

_____
your name