

TOPIC 6. WATER CONSERVATION — EVERY DROP COUNTS!

Chapter 6

Purpose

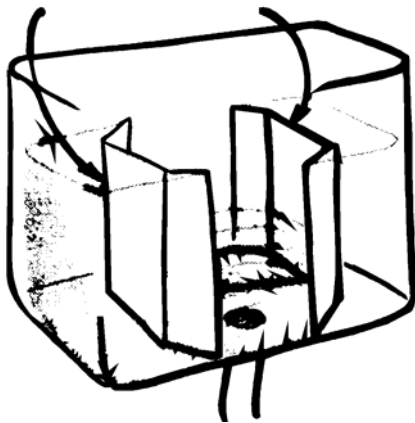
To reinforce with students that water is a resource which needs to be used wisely — and this wise use begins with each individual.

Subject areas

Environmental Studies, Language Arts, Math, Art, Science, Social Studies



TOILET DAM



Procedure

The students should finish this chapter with the understanding that water conservation and wise water use begin with each and every one of us. Emphasize with them that we really don't need to use all the water we do. Reducing the amounts of water we use will not change our lifestyles — we just learn to do more with less. We won't even notice reductions which come from water dams in toilets or low-flow shower heads.

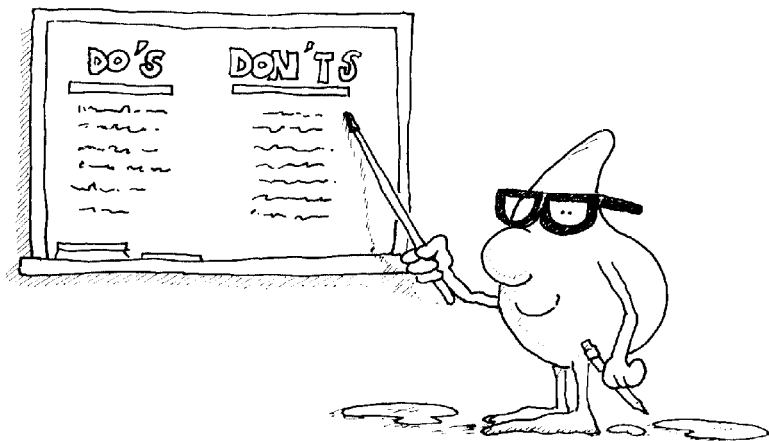
- Stress the importance of water and the ways we take it for granted. Try a variation on the simple experiment outlined in the information sheets. Arrange to have the students carry pails of water over a certain distance without spilling any. So that the water is not wasted, make sure it is used to water a tree or the classroom plants.

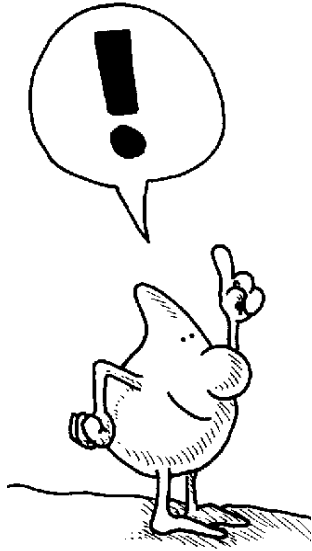
Vocabulary

xeriscaping

References

- Freshwater Series A-6: “Water Conservation — Every Drop Counts!”
- *A Primer on Fresh Water: “Water — DOs and DON’Ts”*
- *Water: No Time To Waste — A Consumer’s Guide to Water Conservation*





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Try this

If you want to demonstrate how much we take water for granted, do this simple experiment:

Bring an empty bucket or pail to school or to a friend's house about a kilometre away from your home.

Fill the bucket with water and measure how many litres the bucket contains. Carry it back to your house and be very careful not to spill any water because that's all you get for one day.

Water is heavy, isn't it? And if you lived in some parts of the world you would spend a large part of each day carrying water to your home. These water trips might make you think

twice about the way we waste water. We use on average about 335 litres of water per person per day in Canada — more than twice as much as Europeans — and much of this water we use is wasted.

Now, about the water you carried home — don't allow yourself to touch any other liquid for one day. Keep a record of everything you use water for during that day. (Don't forget to include water used for cooking — whether you do the cooking or not.)

How important is water?

Just as our bodies need blood (which is 82% water) to live, so does the planet need water. As we learned earlier, we could not exist without water:

- our bodies are about two-thirds water
- all living creatures and all fruit and vegetables need water
- water is home to all kinds of life forms

Yet we take it so much for granted.

We are lucky in Canada. We have lots of water, but even our supply is not endless! It seems that as our population grows, we develop more and more ways to use and pollute our water supply. But our population does not have to grow by much to use a lot more water — in the decade between 1972 and 1981, the population grew by only 5%, but our water use grew by 50%!

As Canadians, we can usually depend on a safe steady supply of water gushing into our homes every time we turn on a tap. This simple fact makes us the envy of many nations in the world where limited water supply and polluted water often make the difference between life and death.

Conservation or wise water use.

Most people hear the word “conservation” and they immediately think of major changes in their lifestyles, especially in the area of water. Not so. Simply stated, conservation means doing more with less. With very few changes in the way we live our lives, we can reduce the water we use in our households by 40%.

Think about it. If your family paid \$200 for water use last year, that would mean a saving of \$80!

A review of why we pay for water

Remember (if you live in a municipality with water purification and



wastewater treatment plants) that every drop of water coming from your tap has been treated to keep it safe for drinking. That’s expensive.

And also remember that every drop of water going down the drain, whether you actually used it or wasted it, has to be treated again.

Unfortunately, water molecules can’t say, “Hey, I’m clean. Don’t waste your money giving me the treatment!” They get whooshed to the treatment plant along with the dirty water molecules. And that costs money.

Think About This

Much less than 1% of the water produced at a large municipal water treatment plant is used for drinking purposes. You don’t have to be a rocket scientist to figure out that a lot of money is wasted purifying water that we just flush away.

How do we use water in our homes?

This is not a classroom survey, but in all likelihood, you probably shower or bathe regularly. However, if you had grown up during your great-grandparents' time, you might have had a weekly scrub on Saturday whether you needed it or not. And, if you lived in some countries, even today, you would be very lucky to get enough clean water to drink, let alone having the luxury of standing in a shower and letting all that water run down the drain.

Think about all the ways water is used in your home. For example:

- cleaning the house
- washing clothes
- flushing the toilet



- cooking
- showering and bathing
- watering the lawn
- washing the car

Facts on Water Use In and Around Our Homes

- Canadians use an average of 335 litres of water each day for household and gardening purposes. The United States uses 380 litres; Israel uses 135 litres.
- Only 10% of our home water supply is used for drinking and cooking.
- About 65% of indoor home use occurs in the bathrooms.
- Toilets use 40% more water than needed.
- The greatest water use occurs in the summer when about half to three quarters of treated water is sprayed on lawns.

How do we change our habits and lifestyles?

It's very simple. Let's start with the bathroom — the room in the house where, on average, each of us flushes 175 litres of water a day down the drain. And, combined with baths and showers, it is the room where about 65% of our indoor water use occurs. While you are looking at water use in the house, check out the kitchen and the laundry room. You can probably see lots of ways where you can conserve water in these rooms too.

And, what about your lawns and gardens? We read earlier about the waste of water on our lawns. Did you know there are lots of plants and shrubs, as well as landscape design, that don't need lots of water? Find out about the use of sprinklers — for example, “oscillating” sprinklers lose a lot of water to evaporation, especially on a hot day.

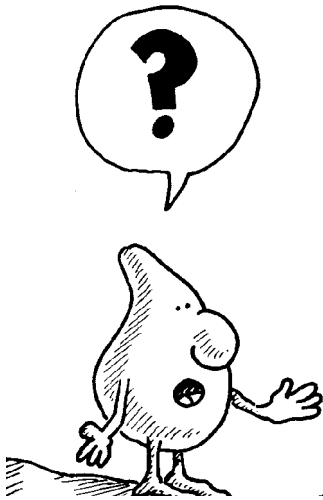
Do you water your driveway? Lots of people use a hose to wash off dirt in the driveway. It's hard to think of a more wasteful use of water around the home! Just think, good clean water, fit to drink, is flowing down the driveway straight into the storm sewer.



Give your car a sponge bath. Don't wash your car with a running hose, using about 400 litres of water a car wash. Use a bucket of soapy water and then hose the car off quickly with a trigger nozzle on your hose. Save yourself 300 litres of clean water.

There are many, many ways we can conserve water. And these ways can all be started at home. Water conservation benefits us all in the long run. It lowers our water costs, reduces health risks, extends the useful life of our infrastructure, and protects our water resources, now and in the future.

“Anyone who has gained any pleasure at all from nature should try to put something back.” — Gerald Durrell



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Chapter 6

Activity 1 — Math

Of the water used in an average Canadian household, approximately 30% is flushed down the toilet. Another 35% is used in showers and baths. Clothes washing takes about 20%. Another 10% is used in the kitchen for drinking, food preparation and dish washing. And, 5% goes for general cleaning around the house.

- If the average Canadian uses just over 335 litres per day, calculate how much water your family uses for each of the above.
- Check your family's water bills for the past year. What was the total volume of water used? How much was used per month? Calculate how much was used per day? How does this compare with your answers above? What is the daily consumption per person in your family?
- The average seven-member family in the Third World uses about 58 litres of water per day. Calculate how much the average four-member family in Canada uses. What is the difference per person?
- Calculate how much water each person in a Third World country would get to use each day. What would you be able to do with this much water? How might your lifestyle have to change?

Activity 2 — Social Studies

1. Brainstorm how many ways your city/community uses water.
 - Make a list. Now, take this list and make two columns, a NEEDS column, and a WANTS column. If you have trouble deciding between the two, consider the following:

Your town water supply has been mysteriously contaminated. You have to buy water from a truck at \$0.25 a litre. Now make your lists. What can you do without or really cut back on?

2. Make the same kind of list for your family’s water uses. To help you decide what is most important to you, think about the following:

There has been a drought and you have to carry your water from a supply area half a kilometre away. Sometimes you have to walk carrying a couple of buckets of water. Think about the ways your family uses water every morning. What water uses would you be able to give up? What habits would you change? (Try carrying two buckets filled with water.)

Activity 3 — Art

Design a bumper sticker, a button, a t-shirt or a poster using a water-wise slogan. For example, “Let’s keep it on tap for the future.”

Activity 4 — Environmental Studies

Water conservation comes down to four simple R's: reduce, repair, recycle, and retrofit.

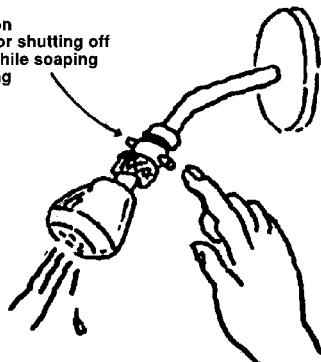
- Take each of the R's and write out one rule you and your family can create to use water wisely and save water, money, and energy.

Look at the following list and check off the water-saving measures you already take in your house:

- replace your toilet with a low-flush toilet using about 50% to 80% less water per flush
- put "toilet dams" (or other "displacement devices") in your toilet — but don't use a clay brick, it can dissolve
- don't use the toilet as an ashtray or a garbage disposal
- take a 5-minute shower
- don't waste water in an overfilled bathtub



Shut-off button (convenient for shutting off temporarily while soaping or shampooing)



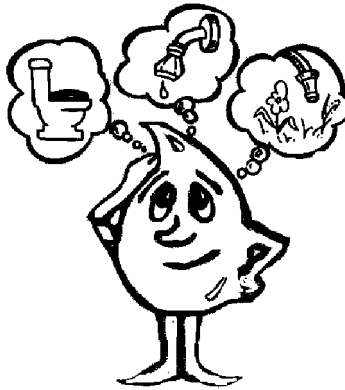
- replace your shower head with a low-flow model
- install aerators on your faucets
- repair drips in the taps
- don't keep the water running while you are brushing your teeth
- check your toilet tank for leaks. A leak of only one drop per second wastes about 10 000 litres of water per year. Put food colouring in the tank — if without flushing the colour appears in the bowl, you have a leak that should be repaired promptly.

What about your kitchens? When you go home tonight, ask your parents to sit down with you and look at ways the whole family can cut down on water waste in the kitchen. For example, instead of letting the water run to get cold water for a drink, keep a bottle in the fridge. Prepare a checklist like the one above for the kitchen or other parts of your household.

Activity 5 — Language Arts

Write a book for younger children

- Write a book about a water character who spreads a “wise water use” message. Use a catchy title, for example, “Squeaky Clean Fights the Grunges.”
- To get started: look at children’s books in the library and ask teachers of kindergarten and grade one about the kinds of books younger children like best.



- Hints for your book:
 - ▶ Be colourful. Remember how you used to like bright pictures.
 - ▶ Don’t make your story too long.
 - ▶ Plan a simple story line and keep the message simple.
 - ▶ “A picture is worth a thousand words.” Keep that old saying in mind — don’t use too much text.

When you have finished

- Ask a teacher if you can read your book to a kindergarten or grade one/two class.
- Ask the librarian to display your book.

Other ideas

- Have a book-writing contest in your class.
- Do you have a computer? Perhaps you could input your text and lay out your own book.

Activity 6 — Math

A five-minute shower with a standard shower head uses 100 litres of water. A five-minute shower with a low-flow shower head uses 35 litres of water. Make up five math problems using this information. Here are a few to get you started:

- If your family has four members, how much water can you save in one day using a low-flow shower head? In one month? In one year?
- If the cost of water (including water treatment) is \$1.14 for 1000 litres, how much money will a low-flow shower head save your family?

Activity 7 — Social Studies

What If?

Choose one of the following situations and explain what you would or could do:

- Your neighbours are washing their car and keep the hose on while water is running down the street.
- You are at a restaurant and the waiter brings you a glass of water you do not want.
- You are going out with the group. Your jeans need washing. There are no other dirty clothes to wash them with.
- You pass by a building which waters its lawns regularly. Even after a heavy rainfall, the sprinkler is on.
- Your friend likes to “fix” the school water fountain so it is continually running.
- You are allotted 10 litres of water a week. How do you use it?
- Many people on your street water their lawns with sprinklers in the middle of the day when the sun is shining. You know that water droplets magnify the sun’s rays, and this causes the grass to burn. And these same people water the lawns on windy days when the drops blow away.

Activity 8 — Science, Environmental Studies

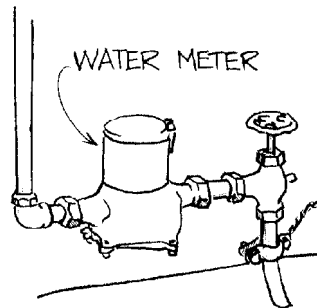
This class activity should be carried out with the help of your teacher.

Simulation: You own a large company which has been to come up with solutions to conserve water. You have broken down the major tasks into the “Solution topics” listed below. Each person (or small group) is preparing a report and/or demonstration to show

how people can save water and consulting money. (Remember, sometimes we have to spend money now to save money later. For example, a California study found that for every \$1 spent in leak detection programs, \$2 was saved.)

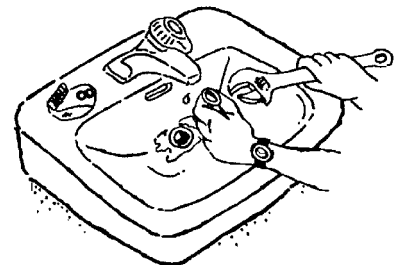
Solution topics:

- water metering or ways to price water use (what about tax credits or rebates for wise water use? Or fines for waste and misuse?)



- water recycling other systems (some industries are now recycling all water they use so it does not go back to the hydrologic cycle untreated)

- wastewater reuse (some places take greywater and use it to water lawns)
- flow-control devices and/or water saving devices (think about your bathroom use)
- drought-resistant landscaping (**xeriscaping**)
- efficient sprinkling/irrigation technology
- leak detection and repair (10 - 30% waste through leaks)
- water use restrictions
- elimination of combined sanitary/storm sewers
- repair and replace old water mains and sewer lines (infrastructure)
- rural septic systems



Activity 9 — Environmental Science

What on earth is “xeriscaping?”

Xeriscaping is also known as “nature-scaping,” that is replacing thirsty grass with native ground covers and flowers that require little upkeep and are drought-resistant. (“Xeros” is the Greek word for dry.)

You know that a lot of water is used to keep our lawns and gardens fresh. Why not plan a garden that doesn’t need much water to be healthy? Consult with local gardeners and research from books. Start your own water-wise garden. Talk to your parents about doing the same.

Activity 10 — Math, Science

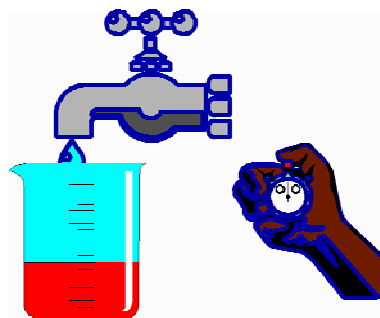
Check the waste from a leaky tap. Try this experiment to find out how much water a leaking tap wastes.

You will need:

- a 500-mL beaker
- a stopwatch

What to do:

- Arrange the tap to drip one drop every second (use the stopwatch here).
- Catch the drips in a beaker.
- Allow your experiment to run for 20 minutes.
- Measure the amount of water you have caught.



Follow-up:

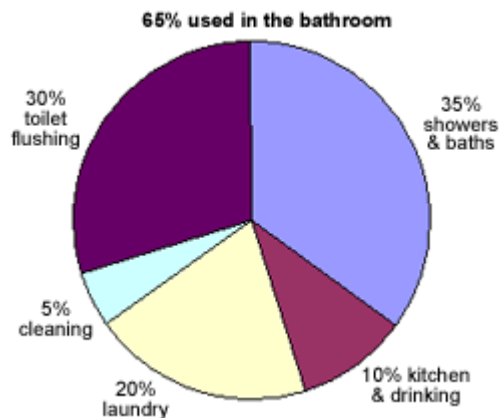
- Calculate how much water is wasted per hour, per day, per month, and per year.
- If a family in an underdeveloped country uses 2 litres of water a day for cooking, how long would they be able to get along with what is wasted by a leaky tap in one month?

Activity 11 — Math

Conduct a water audit and find out how much water you use at home.

If you have a meter:

- Find your water meter at home. Monitor it for one week and chart how much water your family used. Are some days higher than others? Why?
- Find out if you have a leak. Check the meter before going to bed, or ask your parents to help you. (You have to make sure no one flushes the toilet or runs water overnight.) Check the meter first thing in the morning. If the meter shows a change in water use this probably means you have a leak somewhere in the system. It could be the toilet, a dripping faucet, or a pipe that you can't see.
- Don't flush your money down the drain. Find out how much money you could save by buying a low-flush toilet. Compare the number of litres a low-flush toilet uses with the number of litres a traditional toilet uses. Make an estimate. Count the number of times your toilet is flushed during the day. Multiply this by 365. How many litres do you use? What could you save?



Remember: Toilets account for 30% of water used.

Activity 12 — Language Arts

Make up slogans for wise water use and conservation. Brainstorm with your class and come up with some old sayings that you have heard your parents or grandparents use. Change these into sayings that have something to do with water. Here are some to help you get started:

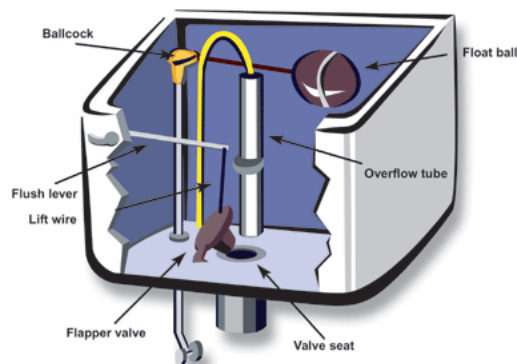
- A penny saved is a penny earned
= A drop saved is a drop earned
- Never put off till tomorrow what you can do today = Never pollute today what you may need to drink tomorrow
- A stitch in time saves nine = Wise use this time saves many a thin dime

Make a poster of your water wise saying.

Activity 13 — Environmental Studies

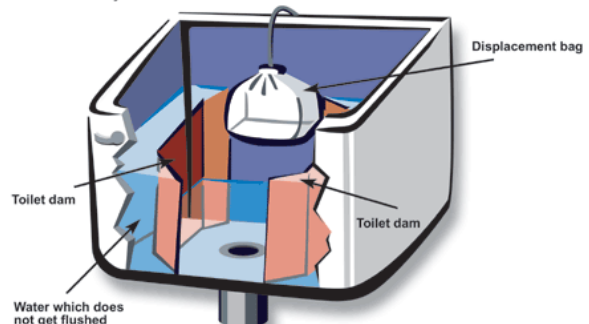
- Most people have no idea how a toilet works. You turn a handle and whoosh, it's gone! Show your demonstration skills and explain to the class how a toilet works. Use a diagram.
- Explain how toilet dams conserve water.

Inside the toilet tank



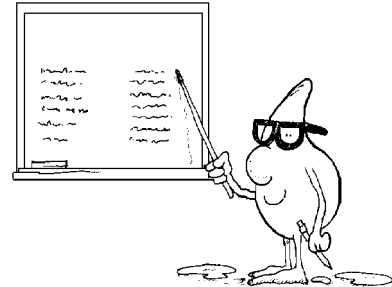
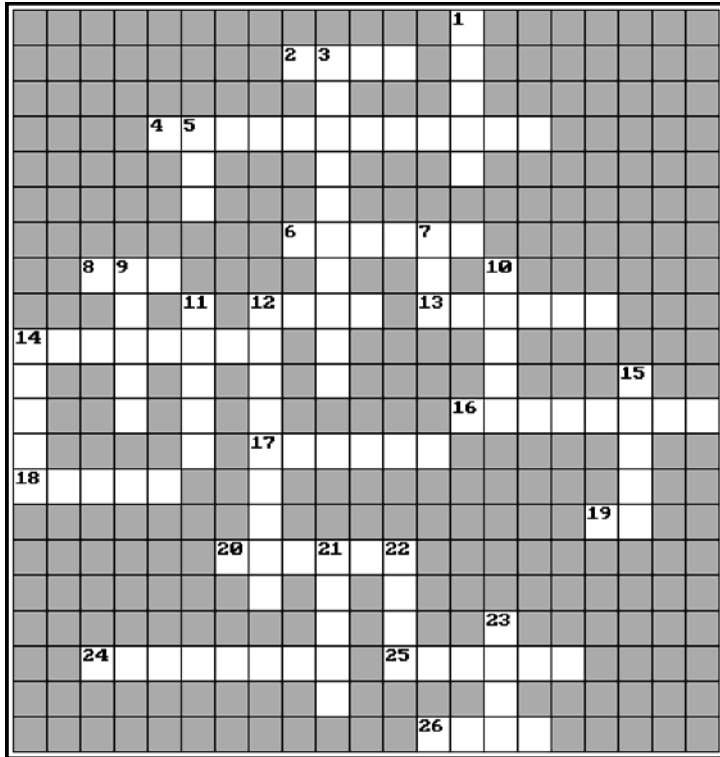
Toilet dam and displacement bag

Two different ways to reduce the refill volume after each flush:



TEST 4

Crossword Puzzle



Across

2. Device used to transport water to your home.
4. Preservation and protection of our resources.
6. Gas formed by heating water.
8. A barrier to hold back water.
12. Container used to carry water.
13. The sun's ____ heats water molecules.
14. Chemical used to purify water.
16. A living person, animal, or plant.
17. Water is made up of hydrogen and ____.
18. Most of Canada's rivers drain ____.
19. The scale on which level of acidity is measured.
20. A small, flowing body of water.
24. Treated waste discharged from a wastewater treatment plant.
25. Countries with less water than Canada would like us to ____ water to them.
26. Do you ____ about water quality?

Down

1. The treatment of water and wastewater helps keep ____ substances from our water supply.
3. To supply water to farms, for example, by ditches and canals.
5. Mining companies use water to separate ____ from rocks.
7. Everyone must ____ water wisely!
9. Water contains two ____ of hydrogen.
10. A device used to measure how much water has been used.
11. A measure of liquid capacity.
12. To filter down, as through soil.
14. We are all links in the food ____.
15. A water ____ or diviner might help you locate underground water.
21. We inhabit the planet ____.
22. Other countries think Canada has ____ water than it needs.
23. Water has been around for over ____ billion years.

Word Puzzle

Find the water-related words in this puzzle. They may be spelled-out backwards, forwards, or Diagonally.

- | | | |
|--------------|----------------|----------------|
| air | household | retrofit |
| bath | infrastructure | save |
| conservation | lead | shower |
| conserve | litre | sponge |
| drain | money | toilet |
| drop | pollution | transportation |
| greywater | purify | treat |
| habit | rain | water |
| health | reduce | wise |
| | | xeriscaping |

T X E R H T L A E H H A B I T
 A R G T R N K A P N E X N N R
 C V E P Q A I O I S T F O R A
 H I R A E R R A I G R I E E N
 G E A L T D R W V A T C X W S
 N R E G N O P S S A T O N O P
 I E M H R H X T V E I N O H O
 P T O T S O R R R C F S I S R
 A A N A T U E S E U O E T G T
 C W E B C S T A T D R R U Y A
 S Y Y T N E O V A E T V L F T
 I E U O C H I E W R E E L I I
 R R C D G O L L I T R E O R O
 E G B E H L E D R A I N P U N
 X A F J I D T N A E L C U P I

Word Scramble

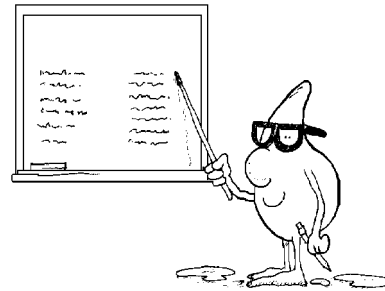
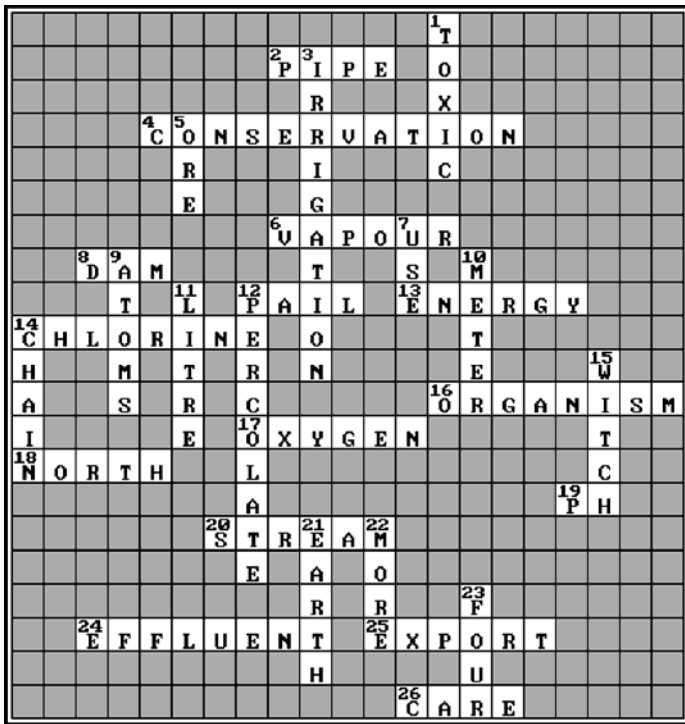
See if you can unscramble each of the words below and then write in the correct definition from those given below:

Scrambled word	Correct spelling	Definition
elryecc	_____	()
coitx	_____	()
egatriri	_____	()
werse	_____	()
hecnoril	_____	()
mosat	_____	()
upraov	_____	()
chogiloryd	_____	()
tgpanrocineoh	_____	()
nogyex	_____	()

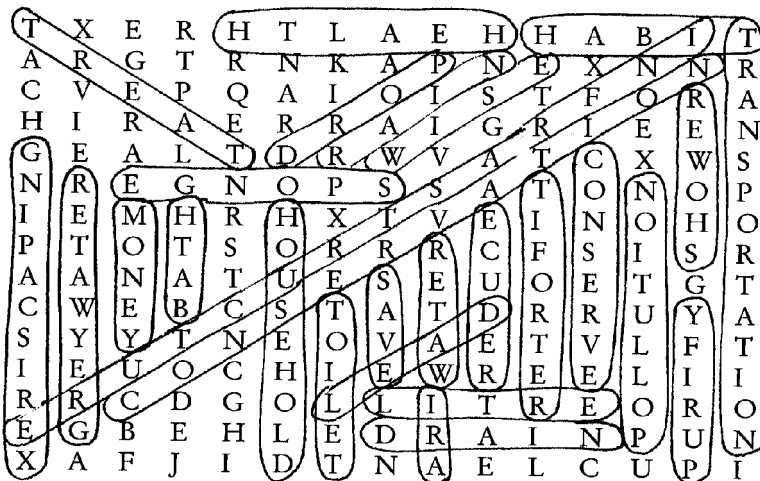
Definitions

- caused by people
- water has one atom of this
- pipe that takes water away from your house
- to supply water to farms by ditches or canals
- poisonous
- to use again
- another name for the water cycle
- water changes to this when it is heated
- water has three of these
- added to water for purifying

TEST 4 Crossword Puzzle



Word Puzzle



Word Scramble

Scrambled word	Correct spelling	Definition
elryecc	<u>recycle</u>	(6)
coitx	<u>toxic</u>	(5)
egatriri	<u>irrigate</u>	(4)
werse	<u>sewer</u>	(3)
hecnoril	<u>chlorine</u>	(10)
mosat	<u>atoms</u>	(9)
upraov	<u>vapour</u>	(8)
chogiloryd	<u>hydrologic</u>	(7)
tgpanrocineoh	<u>anthropogenic</u>	(1)
nogyex	<u>oxygen</u>	(2)