

# SAVE WATER



## EVERY DROP COUNTS

"Every Drop Counts" A water conservation activity book for teachers of grades K-6.

# INTRODUCTION

New Jersey, like many states in the Northeast and around the nation, has experienced water shortages and drought conditions in the past few years. While droughts are largely a product of weather patterns and environmental conditions, each of us can help make such situations less severe. How? By practicing water conservation — at home, at school, at work, and at play. But learning water conservation practices must begin at an early age when children are developing habits and opinions that remain with them for their lifetimes.

The New Jersey Department of Environmental Protection has produced this water activities booklet to help educate students in grades kindergarten through 6 about the importance of water conservation, and how they can wisely use this precious resource.

We recognize that learning the “why’s” and personally adopting the “how’s” of water conservation is greater when people are shown how water affects their daily lives, at their homes and in their communities. By incorporating these interdisciplinary activities into an existing curriculum, teachers will motivate students to look at their own, as well as their families’, water use patterns. Students will then be able to differentiate between patterns that waste water and those that conserve.

This activity booklet is a starting point. It is designed to stimulate students and teachers to devise water conservation activities, and is divided into three sections — “Where Does Water Come From?”, “Water and You”, and “Water and Our Future.” Each section begins with a basic teacher’s plan and is followed by student activities. The activity pages have been designed for reproduction.

Teaching our children the importance of water conservation is the first step in promoting a deeper understanding of the need to safeguard water supplies for the future. However, this goal will only be achieved if scientists, units of government, parents and teachers work cooperatively in educating children.

I urge you to share this activity booklet with your colleagues and students. The lessons students learn will go a long way in promoting the book’s theme — “SAVE WATER... EVERY DROP COUNTS.”

Commissioner  
New Jersey Department of  
Environmental Protection



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# COMPREHENSIVE LISTING OF ACTIVITIES

Code: Discipline: S-Science, LA-Language Arts, A-Art, M-Math, R-Reading, SS-Social Studies

Basic Skills: V-Valuing, C-Communication, CT-Critical Thinking, PS-Problem Solving, GI-Gathering Information

| Basic Skill & Discipline | Activity  | Grade Level | Page |
|--------------------------|---|-------------|------|
| S,A<br>C,CT              | <b>The Water Cycle:</b> Students color a page and do activities concerning the water cycle                                      | K to 2      | S-3  |
| SS<br>CT,PS,GI           | <b>Water Cycle Circle:</b> Students arrange or wear signs of the components of a water cycle                                    | K to 6      | S-4  |
| SS<br>GI                 | <b>Clean Water:</b> Students construct their own water filtration system  | 4 to 6      | S-5  |
| SS                       | <b>A-Maze-ing Water:</b> Students draw a path that connects a water source to a house   | 4 to 6      | S-6  |
| S,SS,M<br>I,PS           | <b>Be A Water Meter Reader:</b> Students learn how to read two types of water meters  | 4 to 6      | S-7  |
| S,A,M<br>C,CT            | <b>Water and You:</b> Students complete a "connect the dots" picture and discuss water in living things                         | K to 2      | S-12 |
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| M,S<br>CT,PS             | <b>Plants Need Water Too:</b> Students experiment with plants and determine the relationship between the plant growth and water | 3 to 6      | S-14 |
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| Discipline & Basic Skill | Activity   | Grade Level | Page |
|--------------------------|--|-------------|------|
| SS<br>GI                 | <b>Water Gets The Work Done:</b> Students complete a crossword puzzle on occupations that depend on water  | 3 and 4     | S-17 |
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| LA<br>PS, CT             | <b>"If" — Water Story Starters:</b> Students write a paragraph or short story beginning with "If" story starters                                     | 2 to 4      | S-24 |
| SS<br>GI, V, CT          | <b>Waters In New Jersey:</b> Students complete a word search puzzle which focuses on N.J.'s waterways  | 4 to 6      | S-27 |
| LA, R<br>GI, V, CT       | <b>The Discovery of George Thompson:</b> Students read a story and answer questions concerning the discovery of a community water pollution problem  | 5 to 6      | S-28 |
| R, SS<br>CT, C, GI, PS   | <b>Glass Lake:</b> Students construct a reservoir called Glass Lake. They then decide how the lake and the surrounding community should be developed | 6           | S-29 |

# SECTION I: WHERE DOES WATER COME FROM?

**Teacher's Overview:** When learning about water it is important for students to understand where their home's clean water comes from, as well as where the waste water goes. By showing the students that they are a component of a water cycle, the entire learning experience will be more relevant and more fun.

## Background Information: Water in the Home

### I. Clean Water

**A. City Water:** Homeowner pays a purveyor (municipality, private company) for water used. Water used is recorded by a meter. Purveyor pumps water from source (reservoir, river, aquifer) to treatment plant. There chlorine is added (kills coliform bacteria), sometimes lime (raises the water's pH or "sweetness") and other treatment steps as needed including coagulation, sedimentation and filtration. (These processes are explained in page S-5.)

**B. Well Water:** Water pump located in utility room or crawl space of home. Pump runs on electricity and pumps water from aquifers under homesite. Storage tank is located near pump. Water flows from storage tank to outlets in home.

### II. Waste Water

**A. Septic Tanks:** Waste water flows into a pipe that leads to a buried, perforated, concrete tank. Waste water then percolates (travels downward) through soil.

**B. Sewers:** Waste water travels from the home through a pipe that connects to the sewer (large network of buried concrete pipes). Manholes in streets indicate sewers. Waste water is pumped to waste water treatment plant. After treatment, water is discharged into flowing bodies of water — river, bay, ocean.

## The Water Cycle

The water cycle is a term used to describe the way in which nature recycles water, or how water is used by living things — made dirty — cleaned, — and ready to use it again.

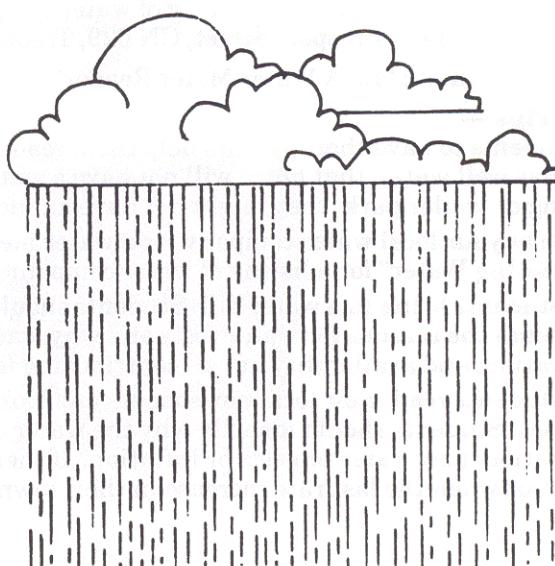
### A Water Cycle Example:



A note about clouds. Clouds form when air becomes saturated with water vapor. Precipitation occurs when there is a change in air temperature and the water vapor condenses.

### Teaching Development

#### Student Activity Sheet: "The Water Cycle"





### **Teaching Tips —**

- 1 — Explain the words evaporation (the changing of a liquid to gas by contact with air and/or heat), condensation (the change of a gas to a liquid when a change in temperature occurs), precipitation (condensed water vapor that falls to the ground), and transpiration (water vapor released by leaves in sunlight).
- 2 — Demonstrate a natural water cycle. Heat water to near boiling point. Fill half of a heat resistant glass container with the hot water. Cover the container with a cool glass lid or pie plate. The water vapor will cling to the glass lid because it is cool. Eventually the minute drops of water vapor cling together forming droplets, then drops. Because the drops are too heavy to cling to the lid, they fall into the container. Explain to the students which parts of the experiment represent water in the forms of rain, lakes and clouds. Explain the role of the sun in the water cycle. Review how the terms evaporation, condensation, and precipitation were exemplified in the experiment.

### **Student Activity Sheet: "Water Cycle Circle"**

#### **Teaching Tips —**

- 1 — Prior to this activity discuss how residents receive fresh water in their homes as well as where residential waste water goes.
- 2 — For children in grades K-3, construct one set of signs for the entire class. Attach a string to these signs so they hang from the students' necks. Keep the set of signs simple. For example, the kindergarten set would include the ocean, sun, cloud and rain signs. Select the same number of students as you have signs. Place the signs over their heads and arrange the students in a water cycle circle.

### **Student Activity Sheet: "Clear Water"**

#### **Teaching Tips —**

- 1 — Consider reading the "Clear Water" information sheet to the students. Discuss the process as it relates to the community's water filtration system. Discuss the key words. Use these words as the basis for a water-related spelling contest.
- 2 — When constructing the water filtration system, consider dividing the class into groups. Each group could conduct the experiment and discuss their results.

### **Student Activity Sheet: "A-Maze-Ing Water"**

#### **Teaching Tips —**

- 1 — Visit a local water company. A listing of water companies is available by contacting the Office of Water Conservation, 1474 Prospect Street, CN 029, Trenton, NJ 08625.

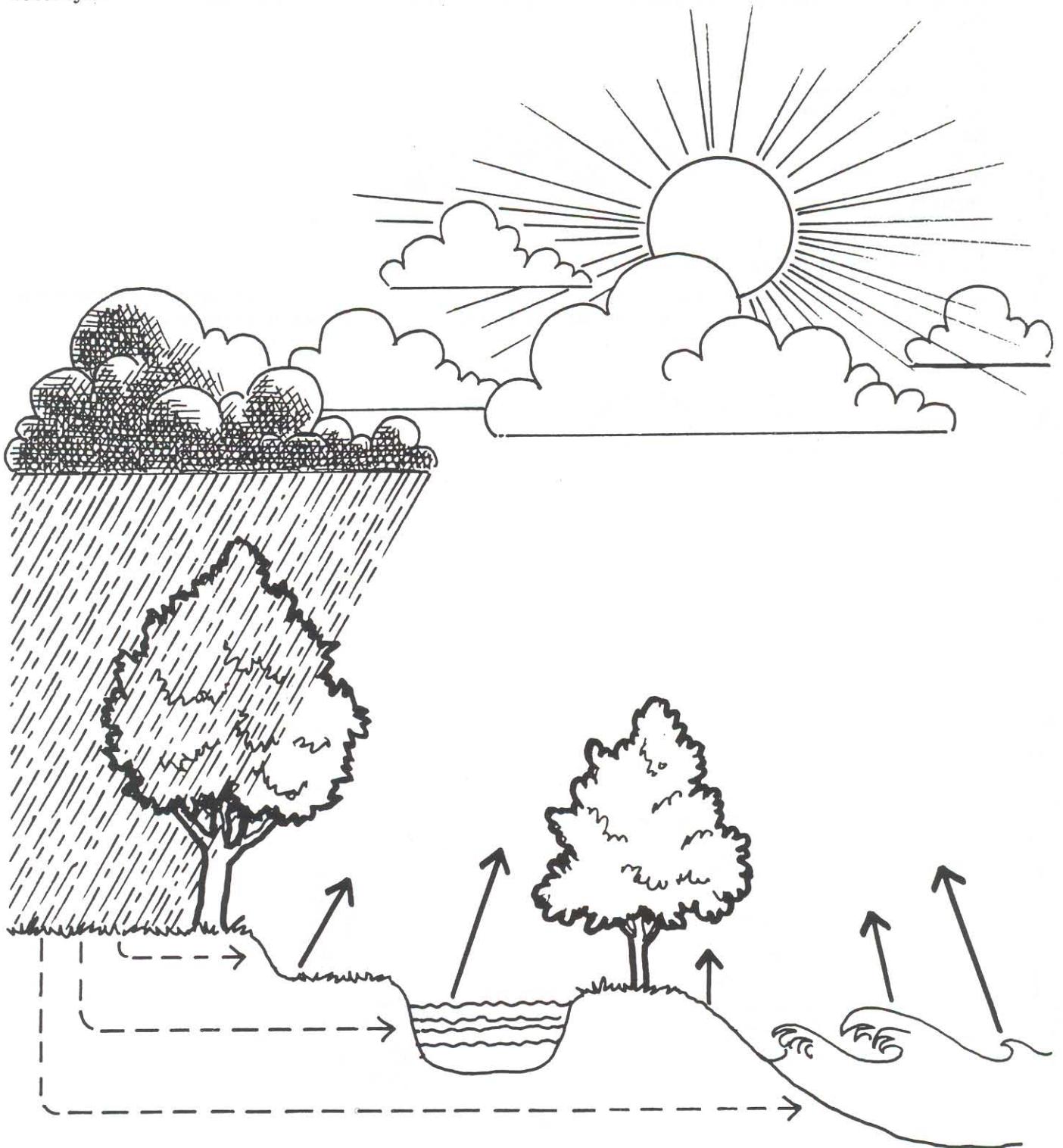
### **Student Activity Sheet: "Be A Water Meter Reader"**

#### **Teaching Tips —**

- 1 — Ask students to have their parents help them read the water meter at their home. Remember, if a home has well water, that home will not have a water meter. Also, if students live in an apartment building or trailer park, they might not have an individual water meter.
- 2 — Inquire at your local water company for a water meter that may be used for demonstration. Refer to "A-Maze-Ing Water" for a listing of water companies.
- 3 — Have students bring in a water bill. Students should learn how to read the bill. In addition, students can discuss the reasons for water costs and why water is not a free resource. For instance, distribution, purification, and availability are all contributing factors to the cost of water.
- 4 — Have students read their local newspapers and look for articles about water companies and their rate increases. Students should identify why the water company is raising the cost of water. Is it distribution, new water projects or inflation? If there have not been any recent increases, ask students to find out when the last rate increase in their town occurred.

# THE WATER CYCLE

When you take a drink of water, you are drinking water that has been used by other living things many, many years ago. Water is cleaned after it is used by going through the water cycle. Color this picture showing the water cycle.



# WATER CYCLE CIRCLE

Materials: Heavy paper-like oaktag or construction paper  
Markers and Crayons

Using the heavy paper, markers, and crayons, make a sign for each of the things below:

Cloud

Sun

Tree

Faucet (for clean water)

Pipe (for wastewater)

Raindrop

Ocean

Pump

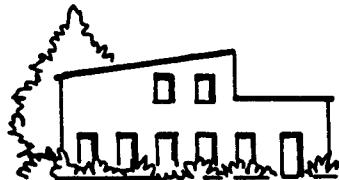
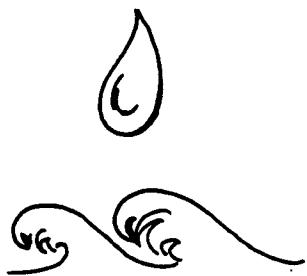
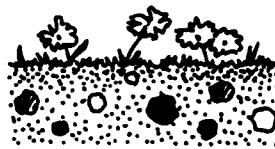
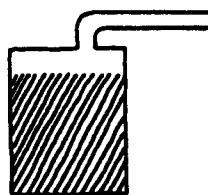
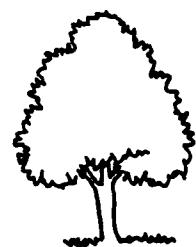
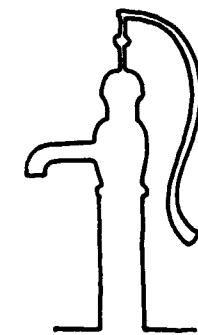
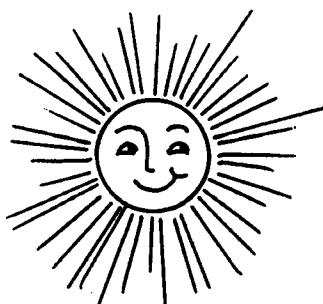
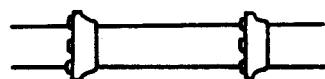
Septic tank

Soil

Wastewater treatment plant

Clean water treatment plant

Arrange the signs in a water cycle that begins and ends with the clean water faucet sign. Your water cycle should show where you get clean water at your house and where your home's waste water goes.



# CLEAN WATER

Drinking water for many cities and towns comes from surface waters like rivers, lakes, reservoirs and underground reservoirs called aquifers. Although this water looks good enough to drink, it often must be cleaned and purified before you can fill a nice cold glass from the tap in your home.

Water treatment systems have been built to clean and purify water so that it is safe to drink. Building treatment systems cost a great deal of money, but they are necessary to have a safe source of water for communities in New Jersey and around the country.

If a town's water comes from surface waters, it must pass through a screen that removes fish, tree branches and other large objects that could damage or interfere with the treatment process.

During the first step, COAGULATION (co-ag-u-lay-shun), a chemical such as alum is added to the water. As the alum dissolves, it forms sticky little particles. These particles attract dirt and other impurities, which then stick to the alum particles. The combined alum particles and dirt are known as floc. The floc is heavy and sinks to the bottom of the coagulation chamber. It can then be strained out of the water during the next step of the treatment process, SEDIMENTATION (said-e-men-ta-shun).

Once the dirt particles are cleaned out, the clear water that is above the sediment is removed so that it can begin the next step, FILTRATION (fill-tray-shun). During filtration, the water passes through several filtering layers, including sand, gravel and sometimes charcoal. They remove any impurities that remain in the water.

Finally, after the water has completed the filtration process, CHLORINE (klor-een) is added to kill any bacteria that remains in the water. Some cities and towns have their water treatment systems add chemicals to their water to make it smell and taste better. Fluoride (floor-ide) is one of these chemicals. Fluoride helps prevent tooth decay.

Where necessary, another treatment step is used called air-stripping, which removes harmful gases that may be in the water.

## CLEAN WATER FILTRATION SYSTEM

You can make a model of a water filtration system in your classroom.

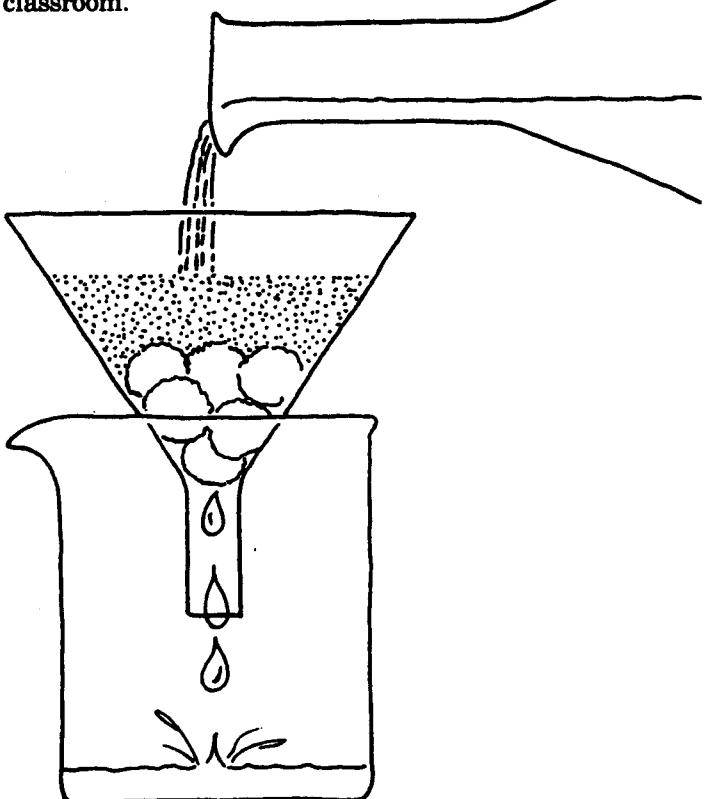
Here's what you need to get started:

- 1 — quart jar
- 1 — plastic funnel
- 5-10 cotton balls
- 2 cups of clean sand
- 2 cups of muddy water (soil and water mixed)

This is how to construct your water filtration system.

- 1 — Pack the cottonballs into the bottom of the funnel.
- 2 — Pour washed sand into funnel so it is 2" below the top.
- 3 — Place funnel into the top of jar.
- 4 — Slowly pour water into funnel.
- 5 — What is happening now?

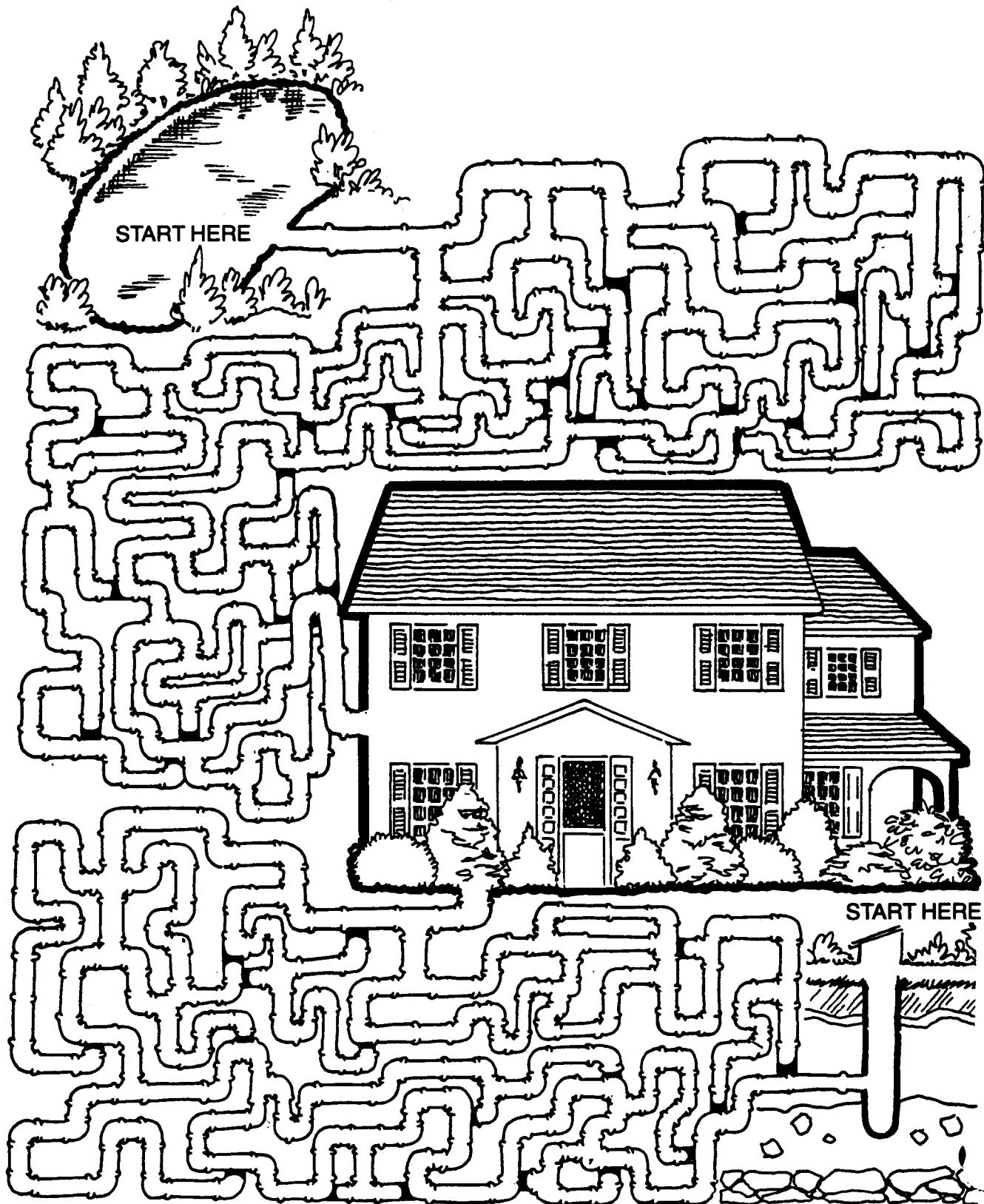
Write your results here.





# A-MAZE-ING WATER

Find the way water from two different possible sources (aquifer, reservoir) can travel through the water distribution system to your home.

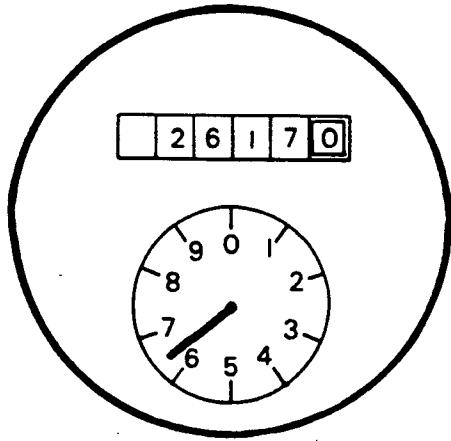
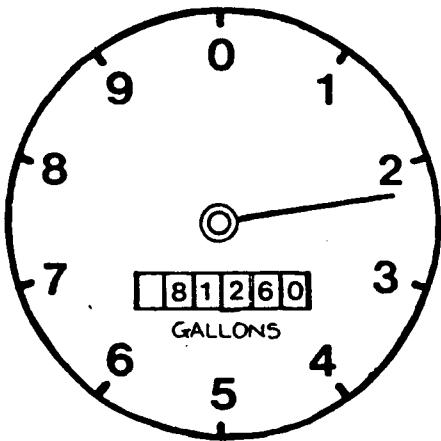


# BE A WATER METER READER

Basically, there are two types of water meters. When you finish this activity you will know the difference between the two types. You also will be able to read the water meter at your house or a house you might someday own.

## Single Dial Meter

It is read like the odometer in a car that measures mileage. The last digit of the reading, "0" is printed on the meter. The needle shows how many more gallons you should add to the number of gallons that appears in the center window. The meter on the left shows 81,262 gallons ( $81,260 + 2$  gallons). How many gallons of water are shown on the meter at right?



## Six Dial Meter

This meter has six separate dials that mark units of ten. You begin by reading the dial labeled with the largest number, usually 100,000. Then read the dials, going clockwise. Record the numbers the needle points to on each dial. If a needle points between two numbers, record the smaller number (except when the needle is between 0 and 9 — then record 9). Don't try to figure out the dial marked either one foot or one gallon. This just shows if the meter is working. The left meter shows 08,126 gallons. What is the reading of the bottom meter at right? Add the answers to the questions below to determine the bottom meter reading.

How many 100,000's are shown?

----- gallons

How many 10,000's are shown?

----- gallons

How many 1,000's are shown?

----- gallons

How many 100's are shown?

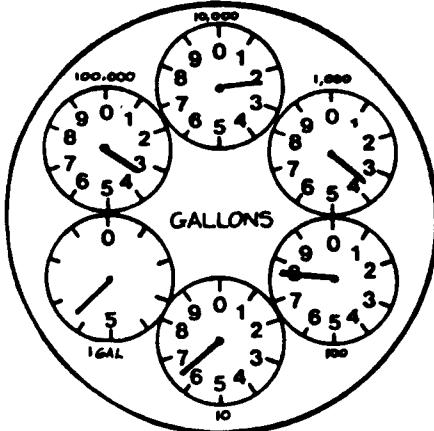
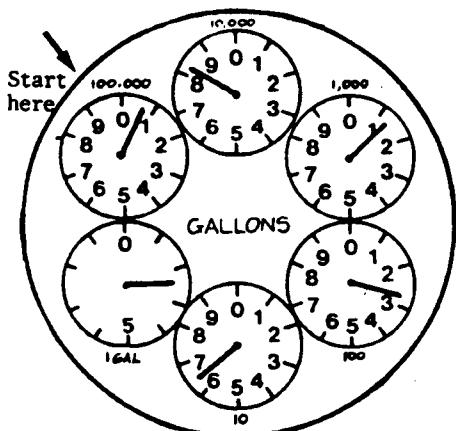
----- gallons

How many 10's are shown?

----- gallons

Total  
Reading

gallons



## SECTION II: WATER AND YOU

**Teacher's Overview:** On average nationally, people use nearly 75 gallons of water daily in their homes. This is a considerable amount when this figure is compared to the 40 gallons of water used daily by the West Germans in their homes. We are accustomed to having water when we want it. However, as populations increase and businesses and industries expand, our water resources might be strained. Water conservation will be imperative. In this section, students are shown the many uses of water. Students also examine their water use patterns and determine why and how some of these patterns should be modified.

### Background Information:

Human beings are composed of 65% water. Water in the human body functions in many different ways. It aids in digestion by carrying food into the body organs and carrying waste products of the body; it lubricates joints and soft tissue; it keeps salt from building up in the body; it regulates body temperature, and it carries oxygen to body parts. Water also cleanses the body. It cleanses tissues and cells, and flows through arteries and veins along with the blood to cleanse important organs such as the kidneys. Water plays a similar role in other animals.

Green plants make their food from water. In the leaf, water is needed to produce the green chlorophyl. Chlorophyl combines with carbon dioxide in the presence of sunlight to make sugar. This process is called photosynthesis.

## WATER AND YOU

### Teaching Development

#### Student Activity Sheet: "Water and You"

##### Teaching Tips —

- 1 — Students can determine the percentage of water in their bodies by using this formula.
  - A — Students weigh themselves.
  - B — Multiply the weight by 2.
  - C — Divide this number by 3. (This is the approximate number of pounds of water in the body.)
  - D — A quart of water weighs approximately 2 pounds, so divide the last number by 2.
  - E — There are 4 quarts in a gallon, so divide the number arrived at in D by 4.
  - F — The final figure is the number of gallons of water in the body.
- 2 — Tell students to color in the amount of water in each figure that is a living thing.

#### Student Activity Sheet: "Water for Fun:

##### Teaching Tips —

- 1 — Have students write a story relating to their drawing.
- 2 — Have students share their stories.

#### Student Activity Sheet: "Plants Need Water Too!"

##### Teaching Tips —

- 1 — Water is one of the four components that green plants need to survive. Air, sunlight, and soil are the other three. When one of these is reduced either by quantity or quality, plants are going to be stressed. Their growth and general health are reduced. They also become susceptible to contracting diseases and parasites. Have students make a list of the ways trees show stress (e.g. — many dead branches, few leaves, yellowing leaves, fungi or mushrooms growing on bark, etc.). Have students locate stressed trees in the neighborhood or around the school.

#### Student Activity Sheet: "More Than A Drop In The Bucket"

##### Teaching Tips —

- 1 — Divide class into teams to answer the following water-related questions. Choose a team to go first, then alternate questioning. If a team answers correctly, then they receive a water drop. If they answer incorrectly, then the question goes to the other team. The other team gets a water drop if they answer the question correctly. Play continues alternating teams. The team that collects the most drops wins!

## "More Than A Drop In The Bucket"

### Answers

1. True.
2. False. A person can live a week or less without water.
3. True.
4. True.
5. False. An 800 square foot swimming pool holds about 30,000 gallons of water.
6. True.
7. False. An average body needs at least  $2\frac{1}{2}$  quarts of water a day to be replenished. One and one-half quarts from drinking and the other quart from food. The average human body contains about 50 quarts of water.
8. False.
9. False. Only 3% of the earth's surface is freshwater and 2% is stored as ice.
10. True.
11. True.
12. True.
13. True.
14. 100,000 gallons.
15. 3 gallons.
16. 450 gallons.
17. Water
18. A. The blood plasma.
19. Thirst
20. Water
21. Water
22. B. Bathroom
23. D. Cooling
24. E. All of the above.
25. B. Lubrication
26. F. All of the above.

The questions in "A Drop In The Bucket" can be used as part of a competitive game or as a learning exercise. If playing as a game, draw a bucket on the chalkboard and draw in water drops or have students create buckets and drops with construction paper and colored markers.

### Additional:

1. Have students make up their own questions after doing research on water related subjects. Each team can develop their own quiz to the other team.

### Student Activity Sheet: "Water Gets The Work Done"

#### Teaching Tips —

- 1 — Students might need assistance with occupational titles. To assist students write these titles on the board.

#### Answers to puzzle:

**Down**

- 1 — chemist
- 2 — doctors
- 4 — chef
- 5 — sailor
- 6 — farmer
- 9 — florist
- 10 — mechanic
- 11 — gardener
- 14 — fisherman

**Across**

- 3 — pharmacist
- 7 — firefighter
- 8 — hairdresser
- 12 — lumberjack
- 13 — engineer

- 2 — After students complete the puzzle, have them list other occupations that use water. Have them explain why water is necessary to these occupations.
- 3 — Invite parents whose occupations requires the use of water into the classroom to describe their work to students.



### **Student Activity Sheet: "Water All Around Us"**

#### **Teaching Tips —**

1 — Possible answers

Aquifer      Ocean

Boat      Pump

Conservation      Quart

Dam      River

Electricity      Sea

Flood      Tea

Gas      Umbrella

Hydrant      Vapor

Ice      Whale

Jacket      Xebec (boat/slip — If you can think of a better word, please use it!)

Kayak      Yacht

Lake      Zambezi (River in Africa — If you can think of a better word, please use it!)

March

Nozzle

### **Student Activity: "Home Water Use Survey"**

#### **Teaching Tips —**

1 — Tabulate and discuss the students' answers. Focus on water use patterns that emerge.

2 — Have students design their own questionnaire for their parents. Discuss any water use patterns that emerge from their survey results. List ways that each water activity can be done with water conservation in mind. Share conservation ideas with parents and adults who participate in survey.

### **Student Activity: "Wasted Water is Wasted Money"**

#### **Teaching Tips —**

1 — These questions were designed to create an awareness of the value of water as a natural resource. 1¢ was used as an easy sample for math equations. Any amount of money can be substituted into the formulas. The cost of water varies in different municipalities, in different regions of the state, and in different areas of the country.

#### **Answers to problems:**

1. individual

2. individual

3. individual

4.  $15 \times 7 = 105$  gallons

5.  $1,000 \times 35 = 35,000$  gallons

### **Student Activity Sheet: "Are You Water Wise?"**

#### **Teaching Tips —**

1 — This story has been designed to stimulate thinking about water conservation. You may prefer to read the story aloud to your students, giving particular emphasis on certain areas of the story that illustrate either good or bad water use patterns.

It would be helpful to provide more information to the class about the how's and why's of water conservation, to further emphasize the importance of water conservation in everyday life.

Once the students read the story and answer the questions, have them list other ways of demonstrating water conservation. Students then compare their lists.

2 — Have students keep a journal on their home water use.

### **Student Activity Sheet: "What's Wrong With This Picture?"**

#### **Teaching Tips —**

1 — Have students explain their answers.

2 — Have students make a list of other ways people waste water. Have them suggest how people can conserve water or wisely use this natural resource.

3 — With parenteral permission and supervision, have students check toilets in home for leaks. Place a small amount of dye in the tank at the back of the toilet. Make sure students do not flush toilet. If the water in the toilet bowl is colored by the dye, there is a leak in the toilet.

## Student Activity Sheet: "Water Words"

### Teaching Tips —

- 1 — These lists are not comprehensive.

#### Words From Water

|     |      |      |
|-----|------|------|
| art | rat  | war  |
| at  | rate | ware |
| ate | raw  | wart |
| awe | tar  | we   |
| ear | tare | wear |
| eat | tea  | wet  |
| era | tear |      |
| eta |      |      |

#### Words From Conservation

|            |              |         |
|------------|--------------|---------|
| ace(s)     | noise        | sent    |
| active     | nonactive(s) | servant |
| arc(s)     | none         | serve   |
| are        | nose         | since   |
| art        | not          | siren   |
| ascent     | note(s)      | site    |
| ascot      | notice(s)    | starve  |
| at         | notion(s)    | stave   |
| ate        | nova         | store   |
| car(s)     | novice(s)    | son     |
| care(s)    | ocean(s)     | tan     |
| case       | on           | tar     |
| certain    | or           | tare    |
| con        | oreo(s)      | tea(s)  |
| contain    | race(s)      | tear    |
| consent    | raise        | tie(s)  |
| convent(s) | ran          | toe(s)  |
| convert    |              |         |

- 2 — Have students create a water conservation bulletin board in the classroom. Develop a "water awareness week" and a questionnaire regarding water usage. The questionnaire could be given to family members and friends and the results shared with the class. Students will discover how other people use water.
- 3 — Have students send their water saving ideas to the Office of Water Conservation, 1474 Prospect Street, CN 029, Trenton, NJ 08625.
- 4 — Have students write sentences using 25 of their words.

## Student Activity Sheet: "If — Water Story Starters"

### Teaching Tips —

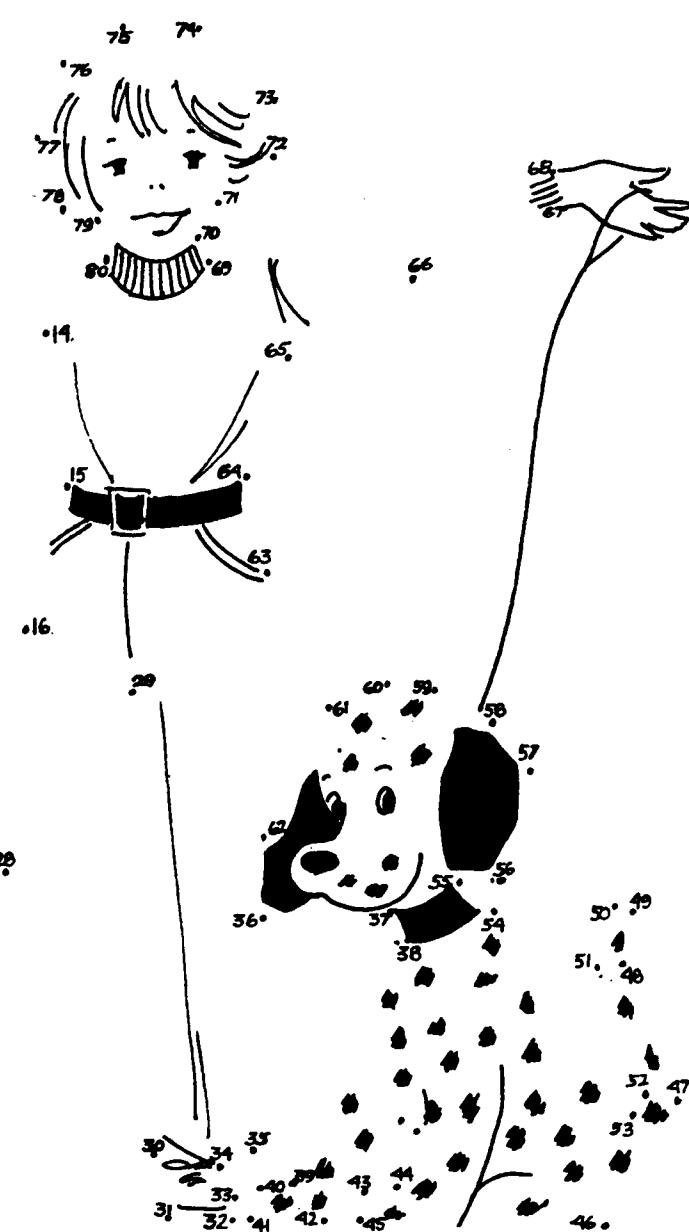
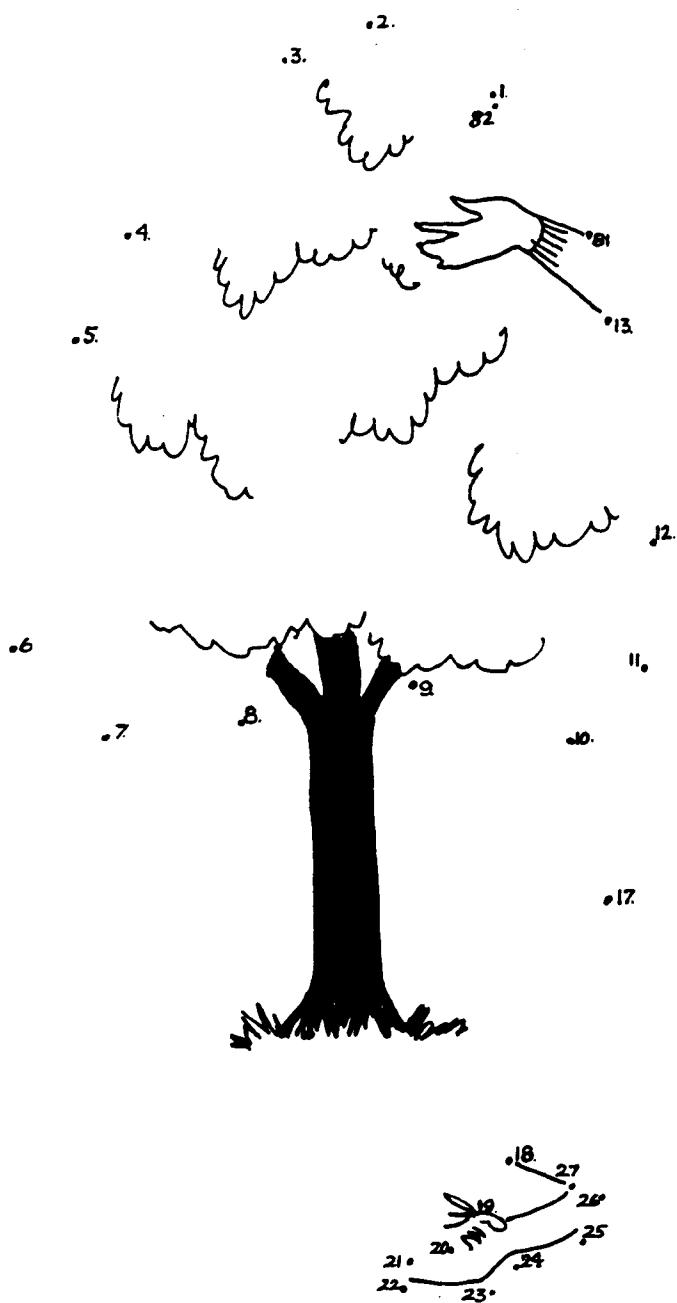
- 1 — Assist students in writing a paragraph or a short story using one or more of the story starters.
- 2 — Have students create their own "If" story starters. Students exchange these and complete their classmates' story starters.





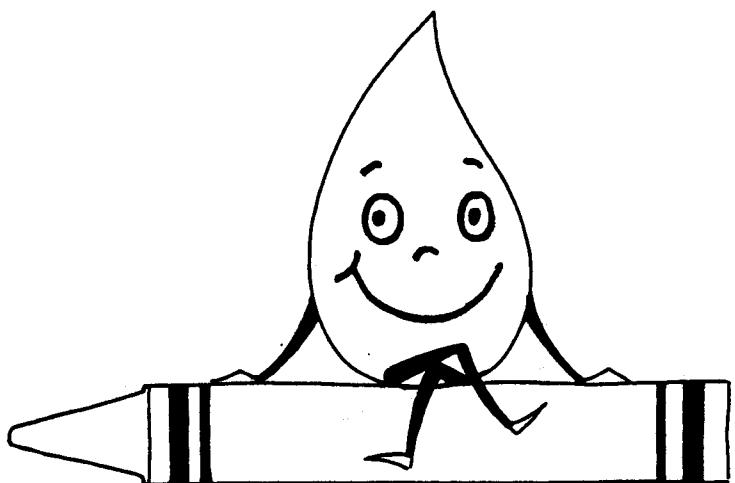
# WATER AND YOU

Connect the dots of each of these figures. Color in the things you think need water to live.



# WATER FOR FUN!

Draw a picture of how you have fun with water. Don't forget to take the lonely water drop along with you.



# PLANTS NEED WATER TOO!

All living things need water. Different types of plants need different amounts of water. Green plants or plants with green leaves use water to make the chemical that makes them green. This is called chlorophyll (klor-a-fill). When chlorophyll joins carbon dioxide (a gas that you exhale) in the sunshine, sugar is made. This process is called photosynthesis (foto-sin-the-sis). Waste products of photosynthesis are two gases. One gas is water vapor and the other is oxygen, a gas our bodies need to function. A cactus needs very little water. A large leafy tree may soak up as much as a ton of water from the soil in one day. That's a lot of water!

This experiment will show you how green plants react to water, when they get too little, too much or just the right amount of water.

Here's what you need to get started.

4 small plants — all the same kind and about the same size

4 labels marked 1, 2, 3 and 4

Here's how you do the experiment.

1 — Put a label on each plant.

2 — Place plant #1 outdoors. The other three remain in the classroom.

3 — Water plant #2 every three days.

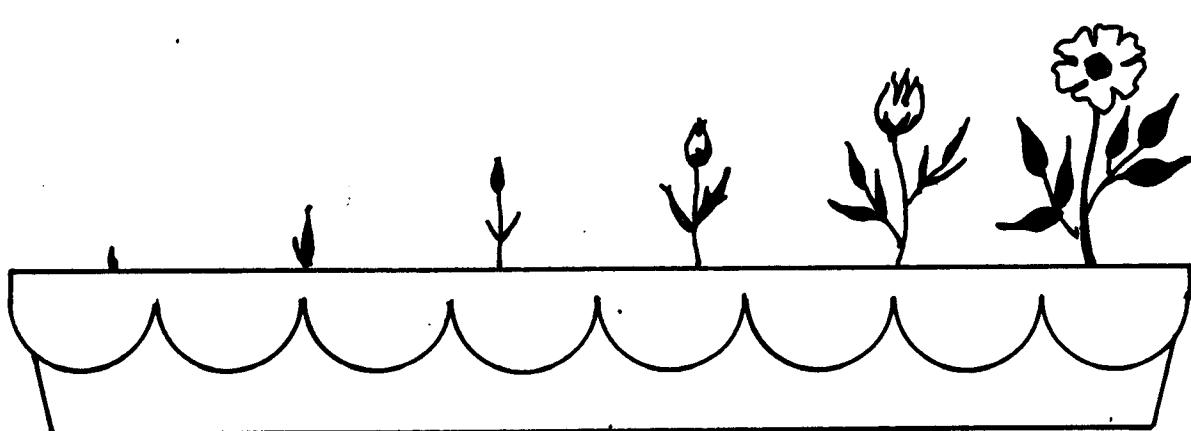
4 — Water plant #3 once a week.

5 — Water plant #4 every other week.

6 — Every two weeks for four months measure the height of each plant. Record that measurement along with a description of each plant's condition on the chart below.

| Plant  | Month #1 |   | Month #2 |   | Month #3 |   | Month #4 |   |
|--|----------|---|----------|---|----------|---|----------|---|
|  | H        | D | H        | D | H        | D | H        | D |
| Plant<br>#1<br>No Water                      |          |   |          |   |          |   |          |   |
| Plant<br>#2<br>Tap Water<br>Every Three Days |          |   |          |   |          |   |          |   |
| Plant<br>#3<br>Tape Water<br>Once A Week     |          |   |          |   |          |   |          |   |
| Plant<br>#4<br>Tap Water<br>Every Other Week |          |   |          |   |          |   |          |   |
| H = height<br>D = description                |          |   |          |   |          |   |          |   |

What did you learn from this experiment?

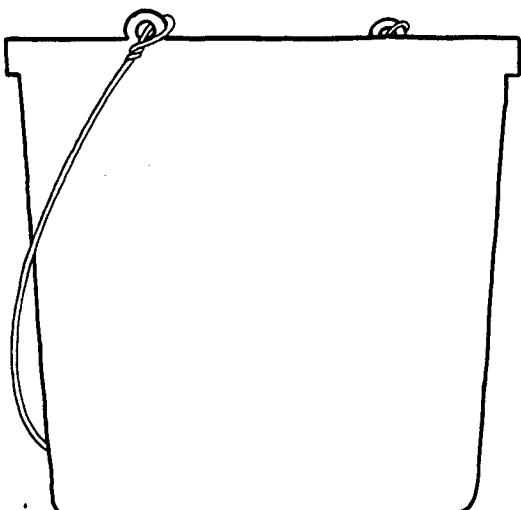


# MORE THAN A DROP IN THE BUCKET!

This is a game. Your teacher will divide the class into teams. The teams will answer the water-related questions below. If a team answers correctly, then they will receive a water drop. If they answer incorrectly, then the question goes to the other team. The other team gets a water drop if they answer the question correctly. Play continues alternating teams. The team that collects the most drops wins! Review the questions below and wait for instructions from your teacher.

Remember — Every Drop Counts!

1. The human body is made up of more than 65% water. T or F
2. You can only live for two weeks without water. T or F
3. A lobster and a potato have the same percentage of water content. T or F
4. The total supply of water on the earth is 370,000,000,000,000,000 gallons. T or F
5. An 800 square foot swimming pool with a average depth of 5 to 6 feet holds 1,000 gallons of water. T or F
6. A fresh almond is only 5% water. T or F
7. The average human body must be replenished with at least one quart of water a day. T or F
8. The average American uses 160 gallons of water per day. T or F
9. 10% of the earth's surface is freshwater and 5% is stored as ice (in glaciers and ice caps). T or F
10. The same amount of water exists today as when dinosaurs roamed the land. T or F
11. Almost all of the body's living cells need and depend on water to perform their functions. T or F
12. Men generally have more water in their body than women. T or F
13. Thin persons have more water in their bodies than overweight persons. T or F
14. How many gallons of water are needed to make an automobile?
  - a) 1,000 gallons
  - b) 10,000 gallons
  - c) 100,000 gallons
15. How much water does a cow have to drink to produce one gallon of milk?
  - a) 3 gallons
  - b) 5 gallons
  - c) 1 gallon
16. How many gallons of water will a leaky faucet waste in a month (30 days)?
  - a) 200 gallons
  - b) 125 gallons
  - c) 450 gallons
17. \_\_\_\_\_, carbohydrates, fat, protein, vitamins and minerals are the six major nutrients humans consume to survive.
  - a) starch
  - b) water
  - c) additives



18. Which part of the body contains the most water?  
a) the blood plasma  
b) muscles and the brain  
c) bones
19. What is a human body signal that indicates the need for fluid?  
a) ears ringing  
b) itching eyes  
c) thirst
20. What does the combination of two hydrogen molecules and one oxygen molecule create?  
a) nuclear fission  
b) water  
c) carbon dioxide
21. Scientists call \_\_\_\_\_ the indispensable nutrient.  
a) salt  
b) iron  
c) water
22. In what room in your home is the most water used?  
a) kitchen  
b) bathroom  
c) laundry room  
d) dining room
23. About 90% of the water in industry is used for what?  
a) generating steam  
b) processing of products  
c) sanitation  
d) cooling
24. The body uses water for  
a) digestion  
b) absorption  
c) transporting nutrients  
d) maintaining temperature  
e) all of the above
25. An important function of water in the body is \_\_\_\_\_, which helps cushion joints and internal organs, keeps body tissues such as eyes, lungs and air passages moist, and surrounds and protects the fetus during pregnancy.  
a) digestion  
b) lubrication  
c) dehydration  
d) respiration  
e) both a and d
26. Water may be used to  
a) produce electrical energy  
b) mine coal  
c) drill for oil  
d) provide nuclear power  
e) all of the above

# WATER GETS THE WORK DONE

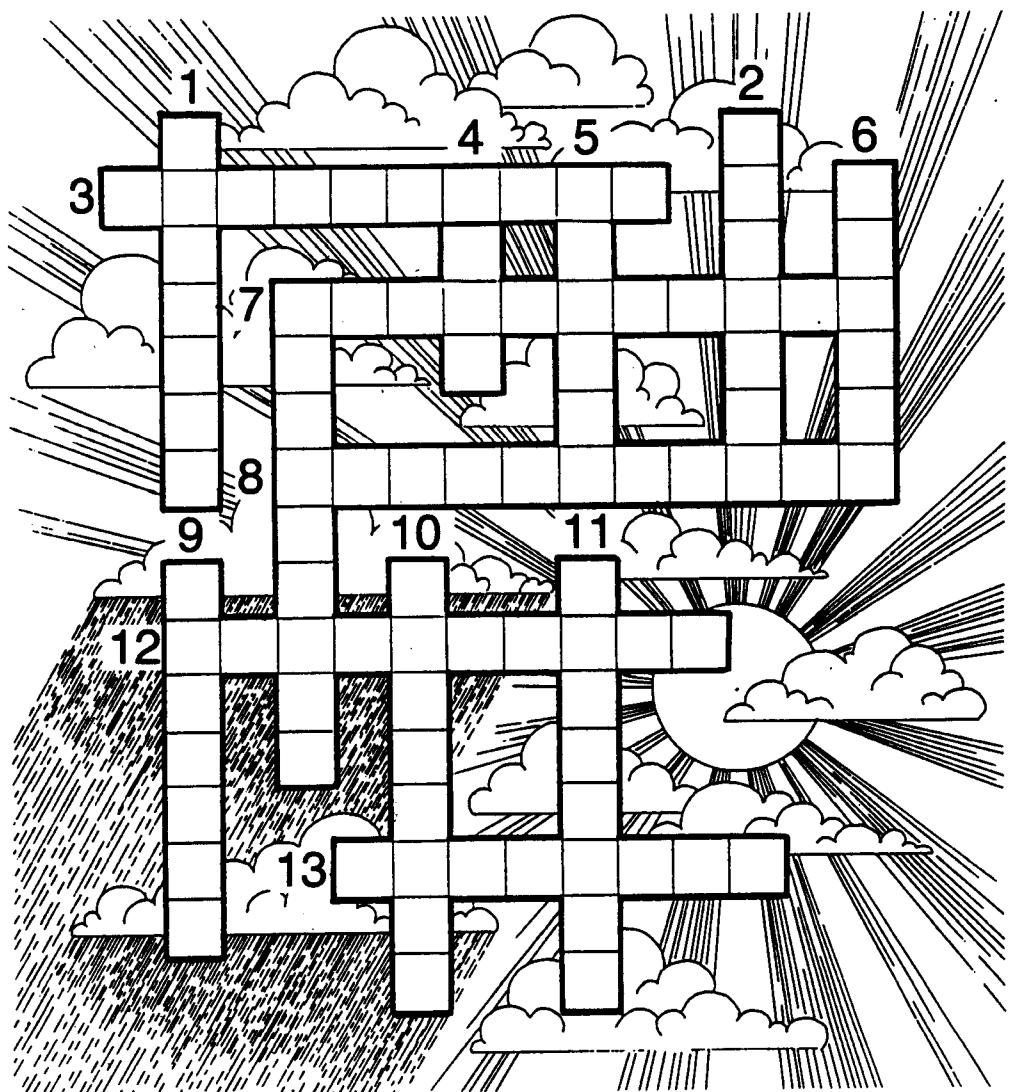
Can you name people who depend upon water for their jobs?

## Across

3. A \_\_\_\_\_ prepares your medicine when you are sick.
7. A person who puts out fires is a \_\_\_\_\_.
8. A \_\_\_\_\_ cuts and styles your hair.
12. A \_\_\_\_\_ harvests trees for the manufacture of paper.
13. An \_\_\_\_\_ designs structures like bridges, dams and highways.

## Down

1. A \_\_\_\_\_ is a person who works in a laboratory.
2. People who treat illnesses are \_\_\_\_\_.
4. The person who prepares food in restaurants is a \_\_\_\_\_.
5. A \_\_\_\_\_ works on a ship.
6. A person who grows food is a \_\_\_\_\_.
7. The person who catches your dinner in the ocean is a \_\_\_\_\_.
9. A person who arranges flowers is a \_\_\_\_\_.
10. A person who fixes cars and trucks is a \_\_\_\_\_.
11. A \_\_\_\_\_ trims shrubs and keeps lawns green.





# **WATER ALL AROUND US!**

Use your imagination! Write a water word for each letter of the alphabet.

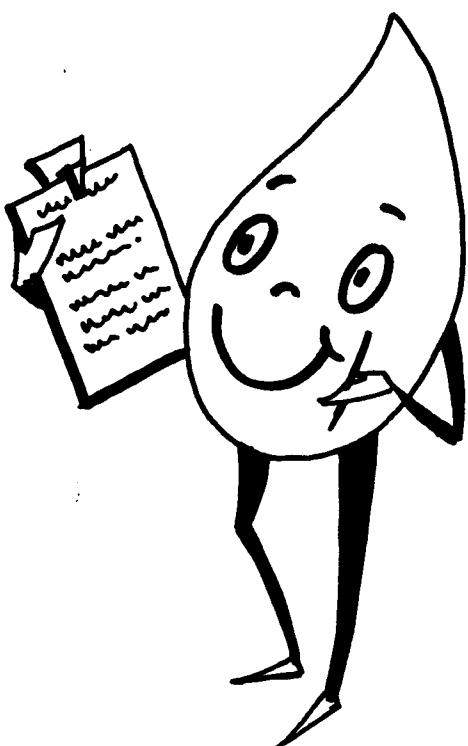
**A  
B  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M  
N  
O  
P  
Q  
R  
S  
T  
U  
V  
W  
X  
Y  
Z**

# HOME WATER USE SURVEY

By answering this survey's questions, you will be able to see how you use water at your home.

1. How many people are in your family? \_\_\_\_\_
2. How many showers do you have in your home? \_\_\_\_\_
3. Does your shower(s) have a flow-restrictor or water-saving shower head, or will your family be installing one? Yes  No  Don't Know
4. How long do you usually let the water run when you take a shower? \_\_\_\_\_
5. Do you think you could take a shorter shower? Yes  No
6. How many bathtubs do you have in your home? \_\_\_\_\_
7. If you usually take a bath, how deep do you fill the tub? \_\_\_\_\_
8. Do you think you could use less water in the tub for your bath? Yes  No
9. How many outside faucets does your home or apartment building have? \_\_\_\_\_
10. Are any of the faucets leaking? Yes  No
11. If you have found a leaky faucet, when will it be fixed and who will fix it?  
When \_\_\_\_\_ Who \_\_\_\_\_
12. When you water your lawn, at what time of day do you usually do it?  
Morning \_\_\_\_\_ Afternoon \_\_\_\_\_ Evening \_\_\_\_\_
13. When you wash the family car, do you leave the hose running all the time? Yes  No
14. When you wash dishes in the dishwasher, do you wait until you have a full-load before washing? Yes  No
15. When you wash dishes by hand, do you let the water run all the time? Yes  No
16. When laundry is done in your home, do you wait for a full load before using the washing machine? Yes  No
17. Do you let the water run a long time to get cold before filling your glass? Yes  No
18. Are there any leaky toilets in your home? Yes  No
19. How does your family conserve water?  
\_\_\_\_\_  
\_\_\_\_\_

20. How does your family waste water?  
\_\_\_\_\_  
\_\_\_\_\_



# WASTED WATER IS WASTED MONEY

Use the key to answer the home water use questions below. By answering these questions, you will see how much water you use to shower, wash the dishes and more. You will also see how much money these activities cost.

## KEY

|                     |   |
|---------------------|---|
| Shower              | = 10 gallons per minute                               |
| Leaky Faucet        | = 15 gallons of water per day                         |
| Fire Hydrant        | = 1,000 gallons of water per minute when fully opened |
| Washing Machine     | = 40 gallons per load                                 |
| Lawn Watering       | = 10 gallons per minute                               |
| Flushing the toilet | = 5 gallons per flush                                 |
| Bath                | = 25 gallons  |
| Dishwasher          | = 14 gallons  |



1. How much water is used in your home for showers?

$$\frac{\# \text{ of showers per week}}{\# \text{ of minutes per shower}} \times \frac{\text{average # of shower}}{\text{total showering minutes per wk.}} = \frac{\# \text{ of gallons per week per minute}}{\text{gallons per week used for showers for a shower}}$$

2. Can you figure out the number of gallons you use for these activities? (Hint: use the above formula and the key)

Taking a bath  
Lawn watering  
Flushing the toilet  
Dishwasher  
Washing the car  
One load of laundry

$$\frac{\# \text{ activity per week}}{\# \text{ of gallons used per activity}} = \frac{\text{gallons per week used per activity}}{\text{gallons per week}}$$

3. If it costs your family 1¢ to use a gallon of water, how much would it cost your family to take showers for one week? One month? One year?

$$\frac{\text{gallons per week used for showers}}{1¢} = \frac{\text{cost to take showers for one week}}{\text{cost to take showers for one week}}$$

(use answer to question #1)

4. You have just discovered a faucet leaking in your bathroom. If the faucet was leaking for one week, how much water did you lose?

$$\frac{\# \text{ of gallons}}{\# \text{ of days}} = \frac{\# \text{ of gallons lost}}{\# \text{ of days}}$$

5. It was a hot August day. Without permission from the fire department, your friend fully opened a fire hydrant from 1:00 pm until 1:35 p.m. How much water did you waste?

$$\frac{\# \text{ of gallons}}{\# \text{ of minutes}} = \frac{\# \text{ of gallons wasted}}{\# \text{ of minutes}}$$

# ARE YOU WATER WISE?

Read the story below about Wally Waterwaster. Find examples of water conservation and water wasting.

"Wally, wake up — you're going to be late for school!" And so another day in the life of Wally Waterwaster began. Rubbing the sleep from his eyes, Wally made his way to the bathroom to get ready for school. "Boy, I sure could use a glass of ice cold water to get me started," Wally said as he turned on the faucet. "If I wait long enough, the water should get really cold." The water gurgled down the drain until Wally decided it was cold enough to drink. He filled his glass and drank the water.

With his thirst taken care of, Wally climbed into the shower. While washing, Wally began to sing and sing and sing. "My voice sure sounds better in the shower than it does anywhere else," Wally thought with a smile. Knock! Knock! It was Wally's mother. "Wally, you've been in that shower for ten minutes. Come out of there now or there won't be any hot water for me when I shower and get ready for work." Wally dressed and went downstairs to the kitchen for breakfast with his mom and dad. His mother prepared his cereal. His father yawned as he read the newspaper.

Realizing Wally had sat down at the table, his father said, "I told you yesterday to clean the mess you and your friends made in the garage two days ago. If the garage is not clean by the time I get home from work, you will not be going to the baseball game this weekend." After a moment Wally replied, "Sure Dad, I'll clean it up. Why are you in such a bad mood?" Knowing that he was overly angry with Wally, his father said, "I'm sorry. I didn't sleep well last night. That leaky bathroom faucet kept me awake."

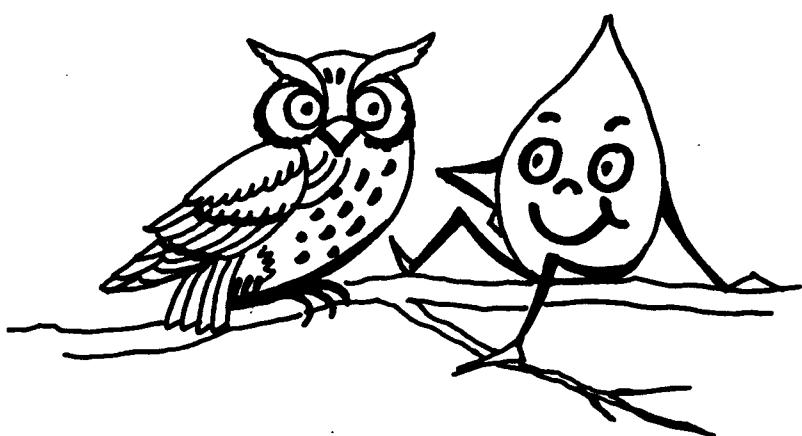
Wally finished his cereal and grabbed his schoolwork. He kissed his mom and dad goodbye and hurried out the door. "Hi Wally — it's about time you were up and ready for school," said Wally's friend Billy Dripsaver. "You'd better hurry or we'll be late." After he caught his breath, Wally asked, "Why have you been getting up so early lately?" "I've been getting up extra early to water the lawn and the flowers at my house before going to school," Billy told him. "I'd rather sleep late and water the lawn after school," Wally said.

On their way to school, Wally and Billy passed Mr. Gutterfiller, who was washing his car. Billy said to Wally, "Gee, look at the hose. Water is squirting all over the place!" "Mr. Gutterfiller, don't you think you should turn the hose off when you're not using it?", Billy asked. Mr. Gutterfiller huffed, "It's too much work to walk back and forth to turn it on and off."

So Wally and Billy hurried off to school.

What examples of water wasting did you find in the story?

What "water wise" advice would you give Wally Waterwaster?



# WHAT'S WRONG WITH THIS PICTURE?

There are many ways we waste water. Circle the water wasters below.

How many did you find?



# **WATER WORDS**

Not only is water a part of all living things, but the letters in water can be rearranged to form many new words.

How many words can you make out of the letters in... WATER?

How many words can you make out of the letters in... CONSERVATION?

Remember, you can only use each letter once!

**W-A-T-E-R**

**C-O-N-S-E-R-V-A-T-I-O-N**

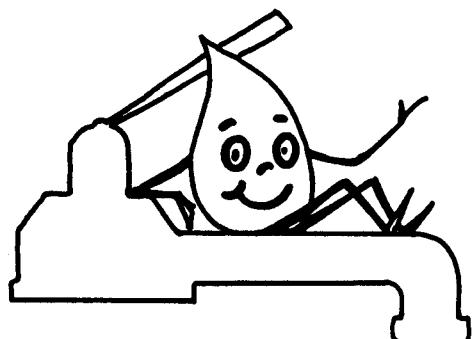




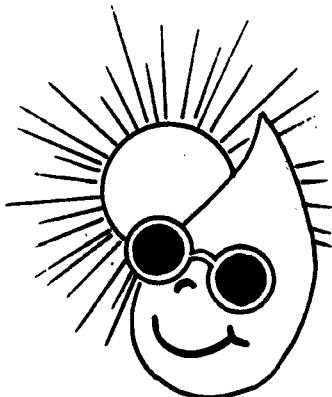
# **"IF... WATER STARTERS"**

Use your imagination and write a paragraph or a short story that begins with one of the "If" story starters below.

1. If I turned on the faucet and no water came out...



2. If it didn't rain for one year...





3. If the water at my house was unsafe to drink...



4. If the water at my favorite swimming spot dried up...



## **SECTION III: WATER AND OUR FUTURE**

**Teacher's Overview:** In this section students are made aware of New Jersey's major fresh water bodies and ways in which waterways like these can maintain their quality for years to come. Students will learn that people are the determining factor for future water quality. They also learn the importance and necessity of water management.

### **Teaching Development**

#### **Student Activity Sheet: "Waters In New Jersey"**

##### **Teaching Tips —**

- 1 — Word search answers
- 2 — The word search can be simplified by only locating the words that appear left to right or top to bottom. Those words are:

|            |              |              |
|------------|--------------|--------------|
| Hackensack | Mohawk       | Raritan      |
| Hopatcong  | Mullica      | Round Valley |
| Hudson     | Musconetcong | Toms         |
| Manasquan  | Oradell      | Union        |
| Millstone  | Pequannock   | Wanaque      |
| Mirror     | Rancocas     |              |

- 3 — Have students locate and label these major rivers, lakes and bays in New Jersey. Using the map on the back cover, students color and label the bodies of water. Outline of the counties have been provided on the map. Have students fill in the county names.

#### **Student Activity Sheet: "The Discovery of George Thompson"**

##### **Teaching Tips —**

- 1 — Students read the story and answer questions about what they read. You can decide whether to have your students record their answers or to discuss the questions.
- 2 — Have students write a song, a story, a play or a videotape about water or water activities and problems.
- 3 — Have students prepare a debate on water conservation. The subject would be the advantages of water conservation versus the disadvantages of water conservation.
- 4 — Have students develop a writing sample about water in everyday life. Topics include "How we could survive without water for a day," How our world would be different without water," or "How important is water to you?" The students can use different vehicles for their presentations, such as a poem, a true story, a fiction story or a research paper.

#### **Student Activity Sheet: "Glass Lake"**

##### **Teaching Tips —**

- 1 — "Glass Lake" is designed to expose students to community planning and to assist students in determining the two major considerations in community planning:
  - A) the area resident's wants and needs, and
  - B) the area's natural resources.

In this activity, students first construct their Glass Lake model after which they read about the reservoir and Meomy County. The students then act as planners, making land and water use decisions on the Planning Chart's proposed development projects.

- 2 — Encourage students to attend their municipal planning board meeting.
- 3 — Discuss with students their area's natural resources and development trends. Have them determine the needs of the area's residents.

# WATERS IN NEW JERSEY

There are 25 bodies of water hidden in the puzzle below. They are printed on the horizontal (left to right and right to left) and vertical (top to bottom and bottom to top). The words ocean, river or lake do not appear as part of the puzzle — only the words in bold. (example — ATLANTIC).

BONUS: Six of the words are on the diagonal (backwards or forwards).

ATLANTIC Ocean

BATSTO River (Burlington)

COHANSEY River (Cumberland, Salem)

DELAWARE River (Sussex, Warren, Hunterdon, Mercer, Burlington, Camden, Salem, Gloucester, Cumberland)

GREAT EGG HARBOR River (Camden, Atlantic, Gloucester)

HACKENSACK River (Bergen, Hudson)

HUDSON River (Bergen, Hudson)

Lake HOPATCONG (Morris, Sussex)

Lake MOHAWK (Sussex)

MANASQUAN River (Monmouth, Ocean)

MAURICE River (Cumberland, Salem)

MILLSTONE River (Somerset, Middlesex, Monmouth)

MIRROR Lake (Burlington)

MULLICA River (Burlington, Atlantic, Camden)

MUSCONETCONG River (Hunterdon, Morris, Warren, Sussex)

NAVESINK River (Monmouth)

ORADELL Reservoir (Bergen)

PASSAIC River (Essex, Union, Morris, Somerset, Bergen, Passaic)

PEQUANNOCK River (Passaic, Sussex, Morris)

RANCOCAS Creek (Burlington)

RARITAN River (Somerset, Hunterdon, Middlesex)

ROCKAWAY River (Morris)

ROUND VALLEY Reservoir (Hunterdon)

SHARK River (Monmouth)

SHREWSBURY River (Monmouth)

SOUTH River (Middlesex)

SPRUCE RUN Reservoir (Hunterdon)

SWIMMING RIVER Reservoir (Monmouth)

TOMS River (Ocean)

UNION Lake (Cumberland)

WANAQUE Reservoir (Passaic)



# THE DISCOVERY OF GEORGE THOMPSON

The following story centers on a problem faced by many people around the country — water and soil pollution. Often, it seems that there is very little any one person can do to help stop the destruction of our precious resources, including water. George Thompson is one person that must face his responsibility when confronted with a terrible problem that endangers his community. Read the story and answer the questions about George and his discovery.

George Thompson loved to explore in the woods along the banks of the Beaverton River, just outside the town of Beaverton where he lived. The many different animals, birds and plants that thrived in the area all had one thing in common — a dependence on the cool, clean water of the river to support their lives. George knew these woods and nature in general very well. He was proud that his knowledge of the outdoors made him popular among the children of Beaverton, who would come to him to ask questions about the things they saw and found in the woods and river.

One day, while strolling along the bank of the Beaverton River, George came upon a sight that made him stop in horror. A dead beaver, two dead ducks and many dead and dying fish limp along the river bank. As he made his way down to the unfortunate creatures, he slipped and fell on a sticky substance that coated the bank and oozed into the river.

"The river is being polluted," George thought to himself as he examined the foul-smelling substance all around him. "But where did it come from?" George wondered.

Could it have been industrial waste seeping into the river? Maybe it was the runoff of rainwater contaminated with chemicals and pollutants from the parking lot of the new shopping mall? Maybe it was seepage from a septic tank from one of the houses on the outskirts of town?

"This pollution could have been caused by one of the town's businesses, by everyone who uses the shopping mall or even one of my neighbors," George thought. "In fact, it could even have been caused by me!"

George began the walk back into town. His mind filled with unanswered questions as he tried to decide what he should do next.

## Questions

1. What would you do if you found yourself in the same situation that faces George Thompson?
2. If you were in Mr. Thompson's position who would you tell about what you had seen?
3. How will residents react to the problem George Thompson has discovered?
4. Do you agree with George that the pollution could have been caused by anyone or everyone in the town where he lives? Why or why not?
5. What can the citizens of Beaverton do to help clean-up the woods and river near their town?
6. What measures should be taken to protect the health of the town's residents who use the river for recreation?

# GLASS LAKE

This is a planning game. You will take the role of a planner for Glass Lake. As a planner, you are concerned with the development of Meomy County. You will decide what buildings are to be constructed and which industries can expand.

To play the game, first construct the Glass Lake Reservoir model. Then read the narrative below.

"You are a planner for Meomy County, where Glass Lake Reservoir is located. You aid in deciding how your county's natural resources of air, water, soil, minerals, plants and wildlife are used and/or affected by industry. You also aid in deciding what buildings are built and how they are built.

The population of Meomy County is 50,000 people. Half of the population is between the ages of 20 to 35. A quarter of the population is 36 to 55. An eighth of the population is 55 and older. Another eighth of the population is 19 and younger.

Glass Lake supplies all the water to Meomy County residents. It also provides people with a great place for swimming, boating and fishing.

The soil surrounding Glass Lake is loamy\* and supports trees like sugar maple, oak, hickory, beech and white pine. Also, portions of the land contain large deposits of coal."

Look over the "Proposed Building Projects Under Review" on the Planning Chart. Answer questions A, B, and C as they relate to the proposed projects.

\* A loam is a soil made of sand, clay, and silt particles.

GREEN — Property owned by Miller's Mining Company.

YELLOW — Property owned by Georgia Atlantic Lumber Company.

ORANGE — Property owned by U.S. Citizens. It is a National Wildlife Refuge.

PURPLE — Property owned by Glass Lake Ski Resort, Inc.

BROWN — Property owned by individual homeowners.

Scale 1" square = 1 square acre

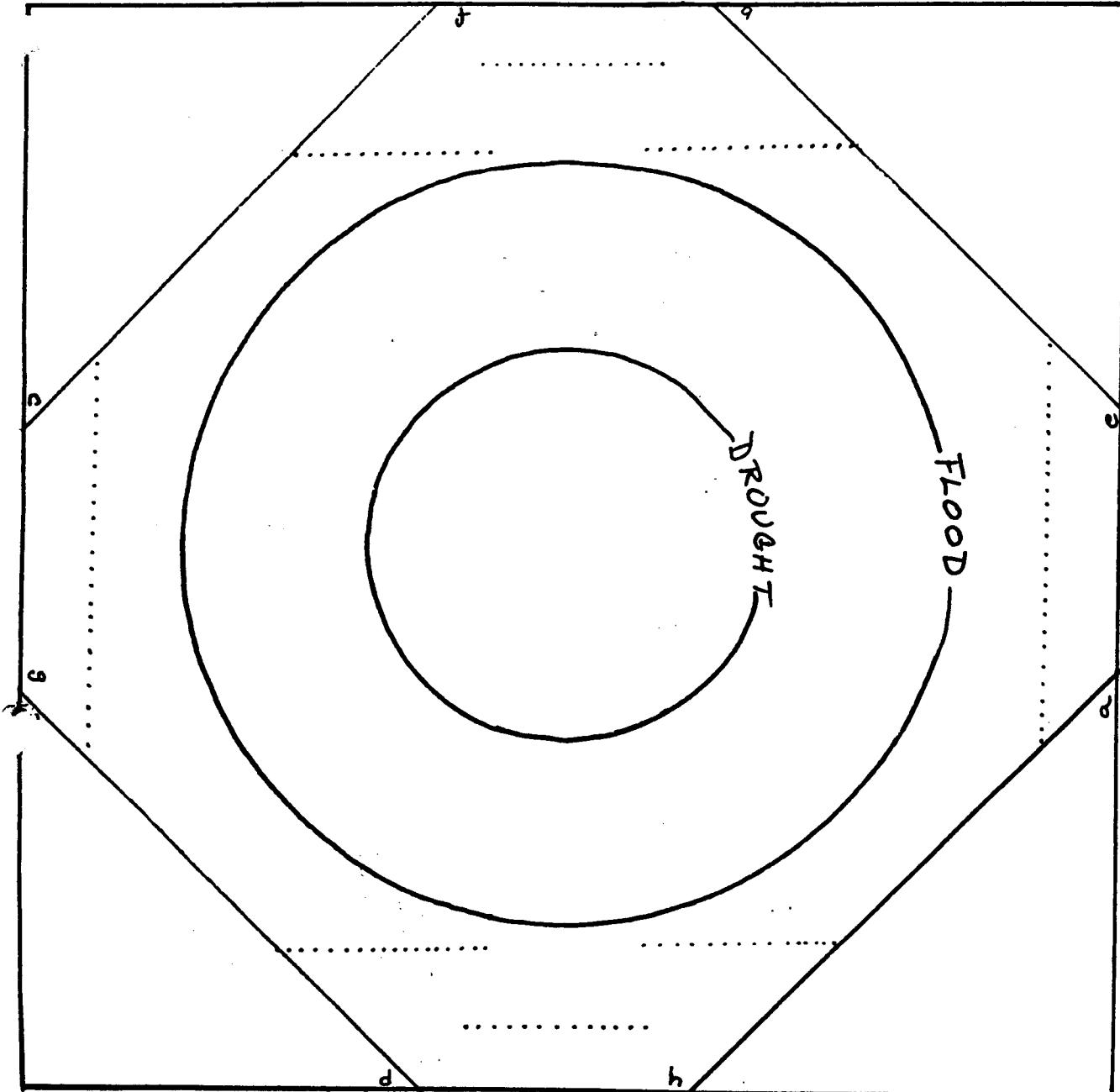
Extend property boundaries into the basin



# GLASS LAKE PLANNING CHART

| Proposed Building Projects Under Review | A<br>What is the effect of this item on (property owners, homeowners, Georgia Atlantic, etc.)?  | B<br>What is the impact of this item on Glass Lake's natural resources? | C<br>Why this project should or should not be approved? |
|---|---|---|---|
|   | <ol style="list-style-type: none"><li>1. Miller Mining Company wants to expand its operation. It wants to strip mine the coal under the land it owns at Glass Lake.</li><li>2. A development company has purchased the Georgia Atlantic Lumber Company tract. The development company wants to build an amusement park. The amusement park could accommodate 8,000 visitors a day.</li><li>3. The Glass Lake Ski Resort wants to increase its number of summer visitors by installing a hillside camping facility and marina with 12' boats with outboard motors. The facility can provide recreational opportunities for up to 1,500 people.</li></ol> |   |   |

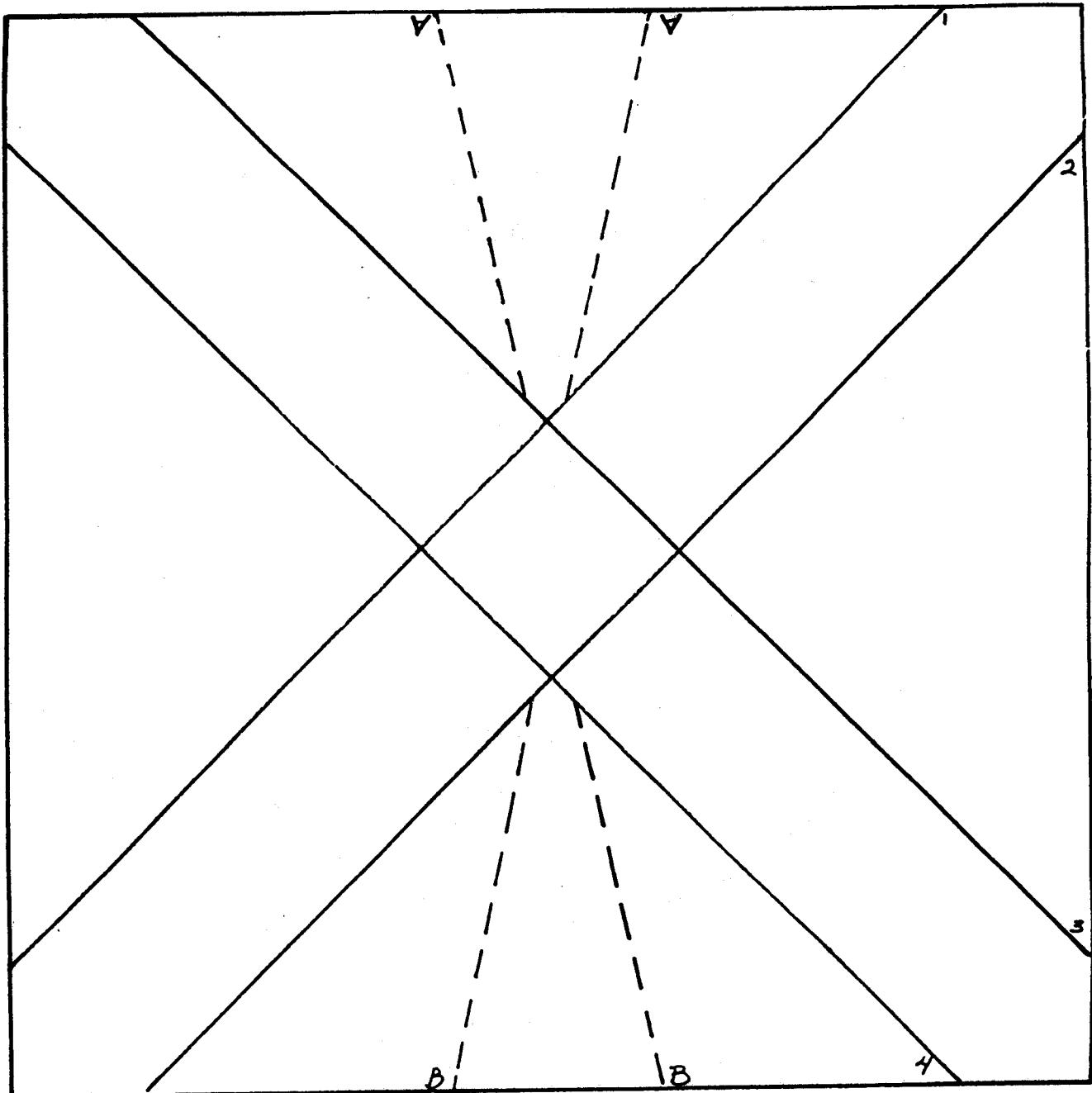


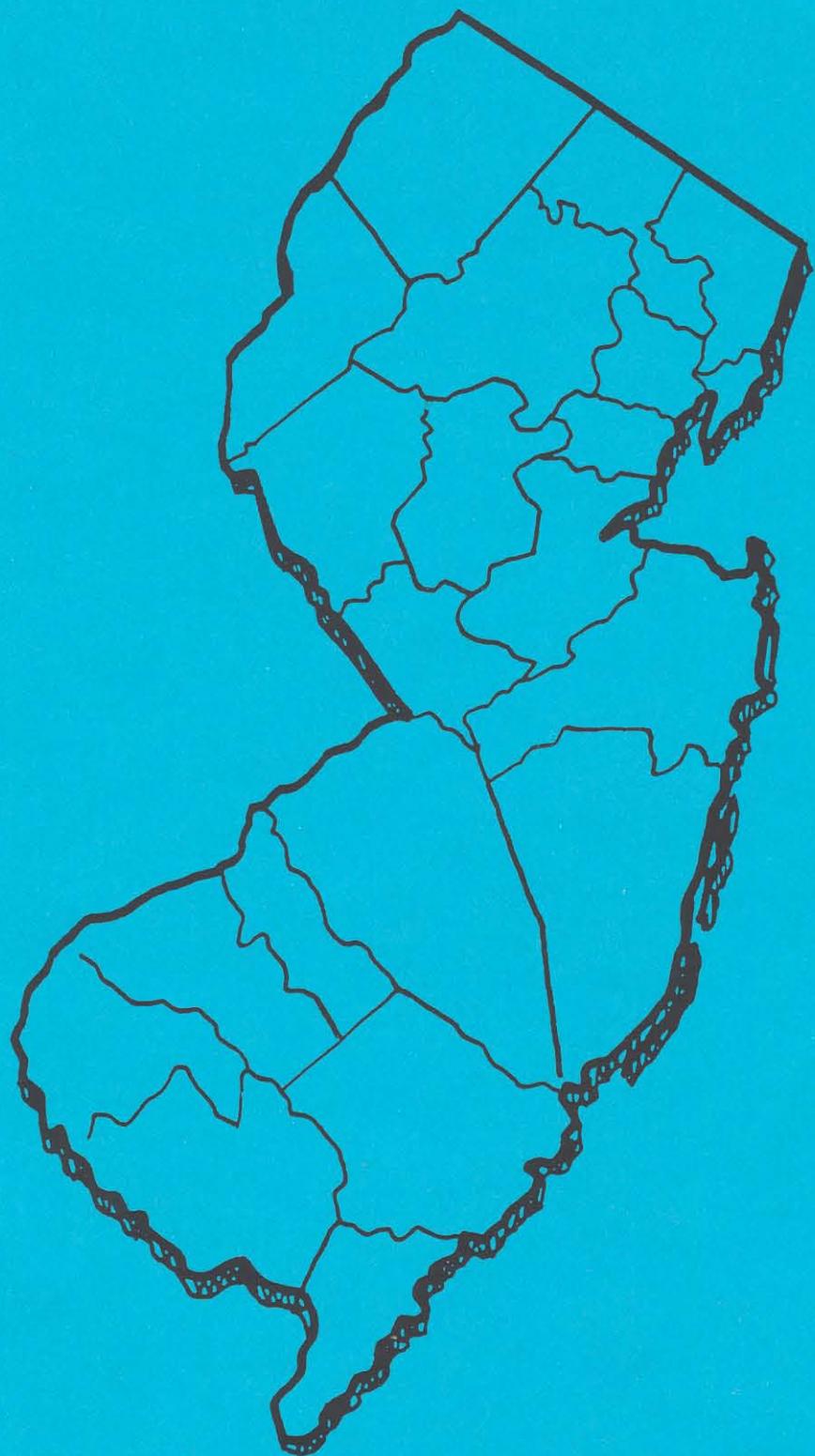


### Construction of Glass Lake Reservoir

1. Fold along lines 1, 2, 3 & 4.
  2. Fold along lines a, b, c & d.
  3. Cut along dashed (...) lines.
  4. Slightly overlap the two A corners and tape.  
Do the same for the two B corners.
  5. Fold along dotted (...) lines
  6. Tape down both flaps.
- But First,**  
**Color Triangles**
- a. Green
  - b. Yellow
  - c. Orange
  - d. Purple
- Color Areas**
- e, f, g, h Brown







"Every Drop Counts" A water conservation activity book for teachers of grades K-6.

New Jersey Department of Environmental Protection