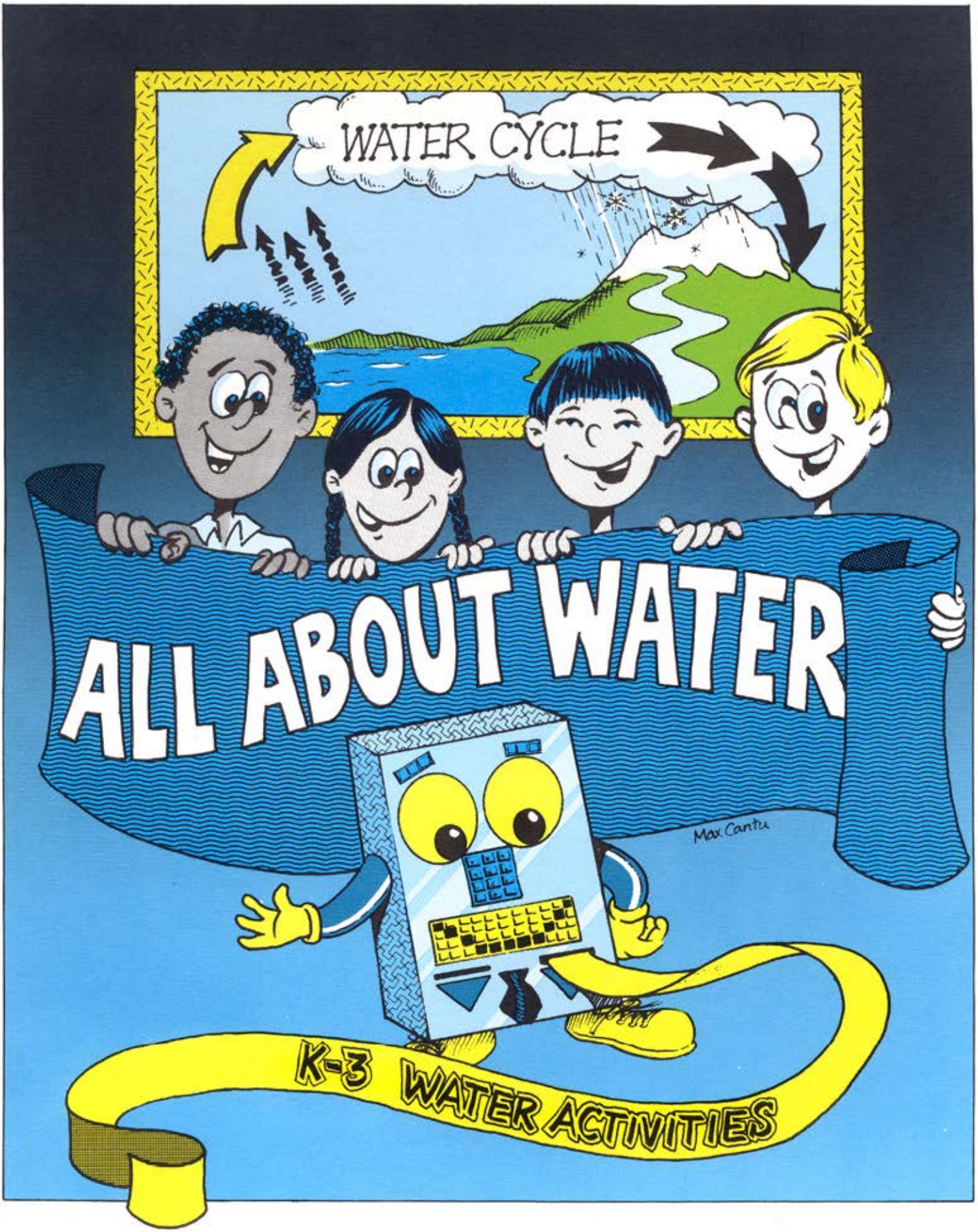

Presented by THE CALIFORNIA DEPARTMENT OF WATER RESOURCES

FOREWORD

Water is vital to all living things. Yet more Californians need to understand and appreciate this limited resource. It is important that teachers and young students have the educational background to appreciate this precious resource and use it wisely.

This book was developed to help California's teachers educate students about water. It is intended for kindergarten through third grade levels and for Special Education grades fourth through sixth.

A special effort was made to design innovative hands-on activities for the young learner. The curriculum in the book integrates science with language arts, math, social studies and art.

Writers of "All About Water" were Maureen Allen, Gale Kahn, and Vince Sipkovich. They are all Science Resource Specialists with the Irvine Unified School District, recipients of awards from the California State Department of Education, and members of AIMS (Activities to Integrate Math and Science) leadership network. Materials have been tested in California classrooms.

Funding was provided through the cooperative efforts of the California Department of Water Resources, Metropolitan Water District of Southern California, East Bay Municipal Water District, Coachella Valley Water District, City of Fresno, and Imperial Irrigation District.

To receive additional free educational materials on water for grades K-12, call (916) 653-1097 or write to the California Department of Water Resources, Publications Office, Room 338, Post Office Box 942836, Sacramento, California 94236-0001.

We hope the instructional guide is useful to you and your students.

Anita Garcia-Fante

Anita Garcia-Fante, Chief
Office of Water Education
Department of Water Resources
State of California

ALL ABOUT WATER

By

Maureen Allen Gale Kahn Vince Sipkovich

Illustrated by
Max Cantu

Developed in cooperation with:

The Metropolitan Water District
of Southern California
Sue Meltzer, Supervisor of Education Programs

East Bay Municipal Utility District
Marilynne Hornitz, Consultant

Coachella Valley Water District
Ann Copeland, Educational Resources Specialist

The Department of Water Resources
Carolyn M. Tucker, Water Education Specialist

City of Fresno
Dave Todd, Water Conservation Program
Manager

Imperial Irrigation District
Linda Sanchez, Educational Coordinator

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CURRICULUM CONNECTIONS

California Water Information

What is true of California real estate is also true of its water. The three things that really count are location, location, and location.

The distribution of snow and rainfall around the state creates its fundamental water dilemma--most precipitation and river runoff is in the north while most of the demands for water are in the arid southern half. Getting water where it is needed and when it is needed is constantly being challenged by climate and geography.

Here are some basic facts that influence California's water picture the most:

Climate. Most of the state is typified by hot, dry summers and wet, cool winters. This means that during summer months, when rainfall is scarcest, the demand for water for crops and household gardens is greatest.

Weather Changes. California has experienced erratic swings in its water supply because of shifts from floods to drought. A year of record flooding can be followed by many years of dryness.

Growth. California is the most populous state in the nation, with more than 30 million people. Urban areas continue to grow. This means greater competition for existing water supplies.

Agriculture. California contains some of the richest farmland in the world. This important industry makes use of 8 of every 10 gallons of water used by people statewide. It takes a total of 1,451 gallons of water to produce one meal of a hamburger, fries, corn, apple, and glass of milk.

Geography. California's major water works, such as the State Water Project, must bring water hundreds of miles from the source to the consumer.

CONCEPTUAL OVERVIEW

The first section of the book is entitled "How Does Water Get to Us?" The activities begin with the students making models of a water pipe system and the landforms that yield freshwater. In this section the students learn about the water cycle including ground water wells and water filtration. The major themes addressed here are Systems and Interaction, Energy, Stability and Scale and Structure.

In section II, "How Much of the Earth's Water Can We Drink?," students become aware of the availability of fresh water on earth. They learn about salt water evaporating to form fresh water (Systems and Interaction and Energy). This section ends with an understanding of the meaning of a drought. Section III, "How do we use water?," covers the many uses of water. Students will observe, apply, and relate the many ways that water affects their daily lives.

The impact of pollution on our water supply is included in section IV, "What is happening to our water?" The activities involve observing and comparing polluted and nonpolluted ground water and testing the effects of pollution on plant growth. (Systems and Interaction)

The last section (V), "How should we take care of our water?," emphasizes water conservation. Students are involved in a variety of activities that concern ways to save water. The final culmination lesson is a take-home activity to provide closure for the concepts learned in the activities.

SCIENTIFIC THINKING PROCESSES

The thinking processes described in the California State Science Framework are woven throughout the activities in this book. In the activities students are involved on a regular basis in observing, communicating, and comparing. The specific thinking processes contained in each lesson are listed in the teacher pages of that lesson.

VOCABULARY

1. **Accumulation:** the water that falls to the earth collects both above and below the surface of the ground.

2. **Aquifer:** a layer of permeable rock or sand beneath the surface that holds large amounts of water.

3. **Aquitard:** a layer of clay or compacted shale that prevents the further movement of water through the ground.

4. **"Closed System":** A closed area in which no matter can get in or leave the system. In this book, we are using a plastic sandwich container, a cup covered with plastic wrap, or a ziplock baggie to represent a closed system.

5. **Condensation:** a process by which water vapor changes to a liquid.

6. **Conservation:** saving or protecting any type of matter from loss or waste.

7. **Dissolve:** A process whereby solid particles mix with a liquid, molecule by molecule, and appear to become part of that liquid.

8. **Drought:** a prolonged period of little or no rainfall.

9. **Evaporation:** the process by which water becomes a vapor or a gas.

10. **Filter:** a material that is used to remove a variety of suspended particles from a mixture. In nature, it is the layers of soil, sand and porous rock material through which the water percolates.

11. **Ground water:** water that collects in rock layers below the surface of the ground.

12. **Percolates:** the movement of water down through the various layers of soil, sand, and rock material.

13. **Pollutant:** a substance that is dissolved or placed in the environment, such as pesticides, paints, oil, harmful bacteria, etc.

14. **Pollution:** the presence of harmful materials that could cause undesirable effects on the environment.

15. **Precipitation:** a process whereby water in the atmosphere falls to the ground in the form of rain, sleet, hail or snow.

16. **Solution:** a mixture in which a substance, solid, liquid or a gas is dissolved.

17. **Water Cycle:** a process whereby the earth's water is moved by the energy from the sun and the force of gravity through a cycle of evaporation, condensation, precipitation and accumulation.

18. **Well:** a hole in the ground from which ground water may be pumped to the surface.

HOW TO USE THIS BOOK

STORYLINE

Option 1

Follow the entire storyline using the puppets and scenery as you go along.

Use the droid link in each lesson to connect H_2O to the storyline. Adding machine tape works well as an answer strip.

Option 2

Pick up the storyline at the point marked "Option 2 start here." You will be introducing the Droid, H_2O, who has been sent from the water department.

As in option 1, use the Droid Link, answer strips, and Droid Student Booklet.

Option 3

Disregard the storyline, Droid Links, references to answer strips and recording in the Student Droid Booklet. The lessons spiral the concepts very well on their own.

HOW TO MAKE THE DROID BOX —

1. Color and cut out the Droid features in the book.
2. Cover a standard copier paper box with aluminum foil. Cover the lid separately.
3. Glue on the Droid features as shown in the picture on page .
4. Cut slits, 1/2" x 4", above the words Input and Output for the Droid Link Strips.

DROID LINK STRIPS —

The strips for all of the lessons are found between the lessons. There are two lesson strips on each page. One strip for the preceding lesson and one for the following. You can cut them on a paper cutter and tape them end to end to have them ready for all of the lessons or you can use them for each individual lesson. Open the box and place the Droid Link Strips inside and feed the lead end through the "Output Slot."

LANGUAGE COMPONENTS —

As a handwriting reinforcement, students can copy each question from H_2O and the agreed upon class response into their Student Droid Booklet.

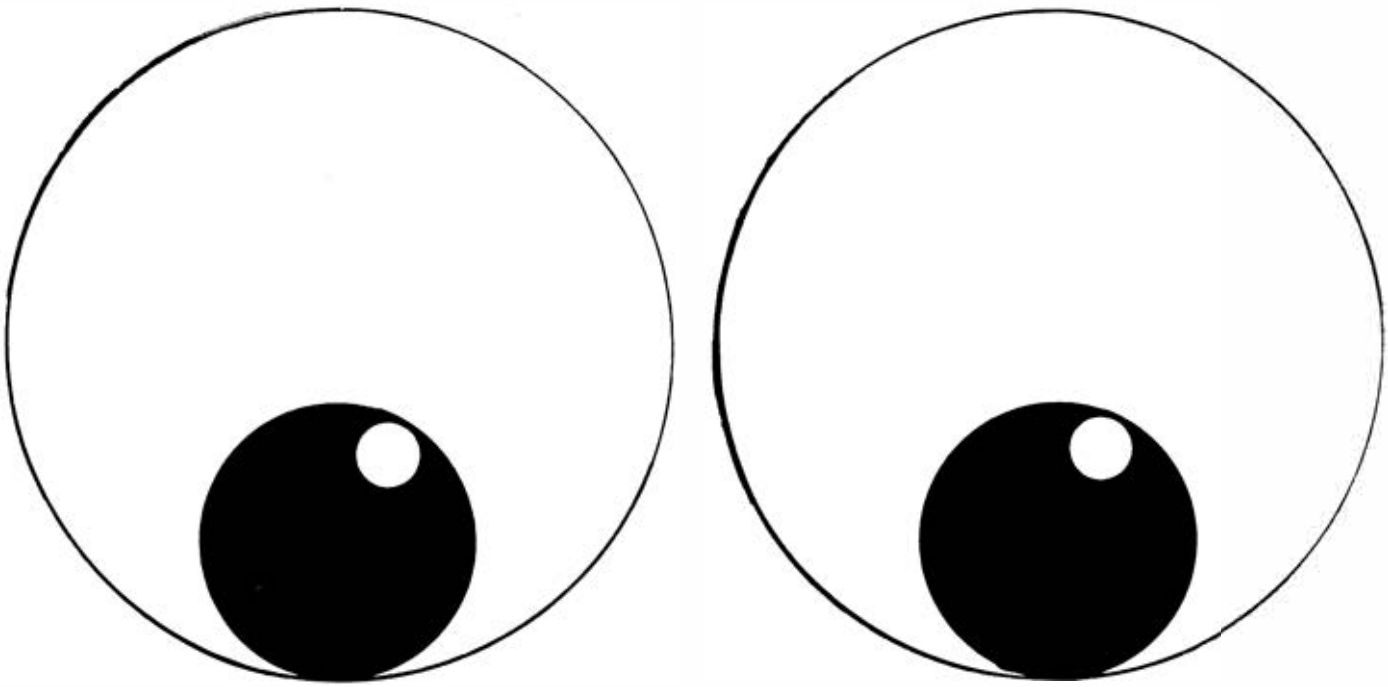
FOR THE SPECIAL NEEDS STUDENT:

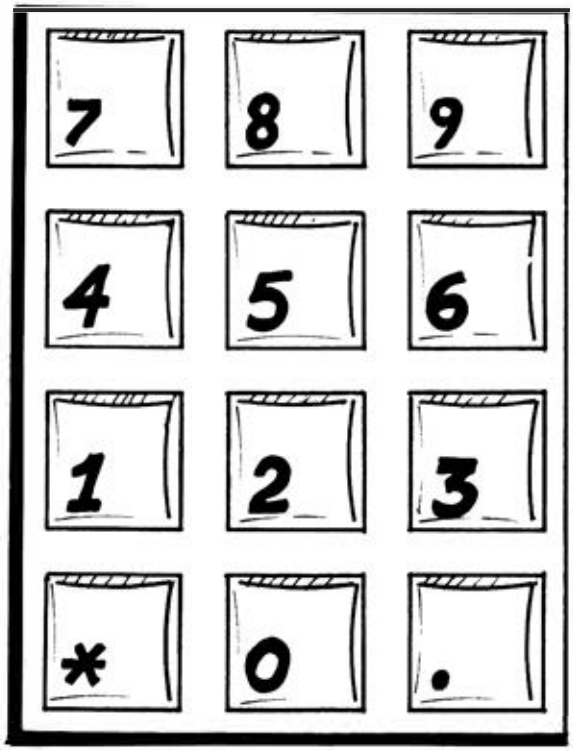
These lessons involve cooperative learning, hands-on, manipulative activities. The teacher will want to form heterogeneous groups to facilitate these lessons. The visual materials will aid in sheltering the vocabulary for the special needs students. All learners can benefit from this very visual, tactile method of teaching.

CALIFORNIA STATE SCIENCE FRAMEWORK

The major themes from the State Science Framework have been identified in the Conceptual Overview of the book. Heavy emphasis has been placed on the thinking processes of Observing, Communicating, Comparing and Ordering.

Parts for the Droid





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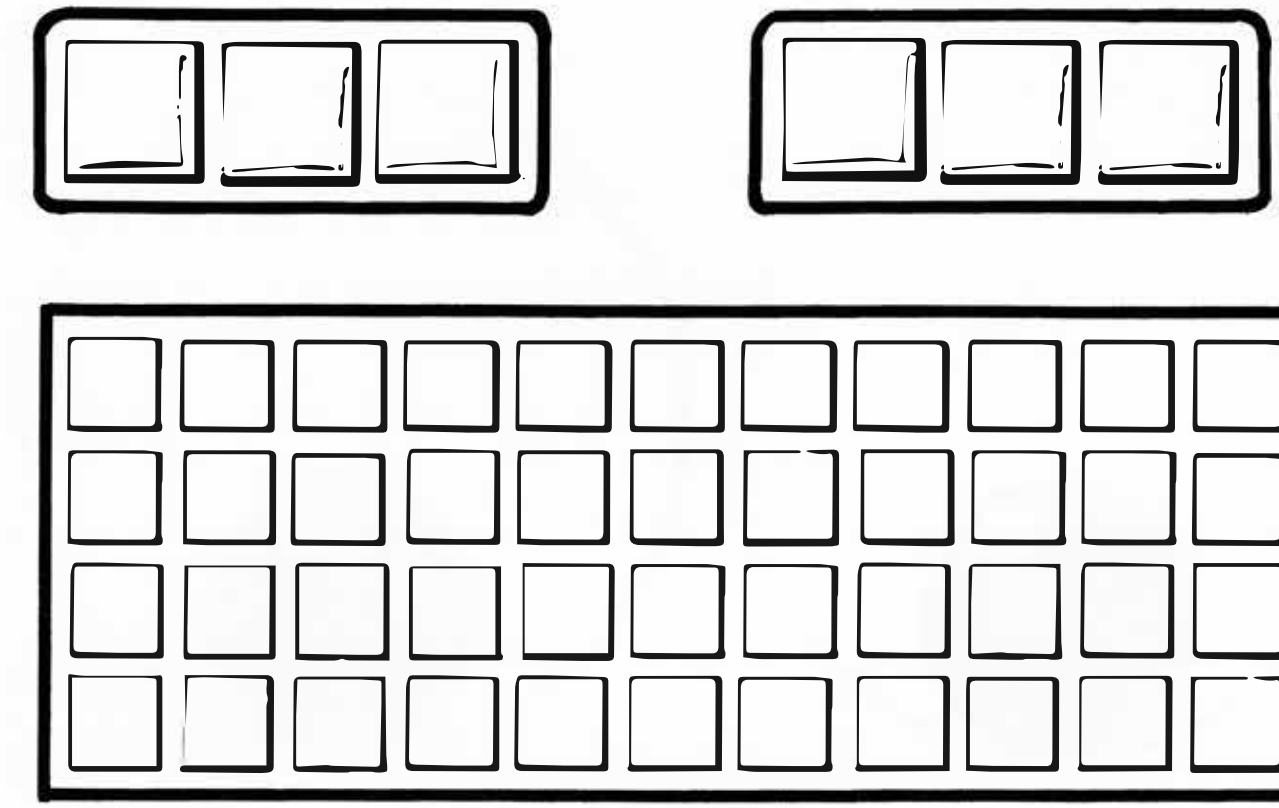


Parts for the Droid

Make 2 Copies

STORYLINE

STORY OPTION 1 STARTS HERE

***Use the following page of character cut-outs and three pages of scenery to tell the story.**

Picture: Millie's home:
One morning, Millie got up very early to get dressed for school. When she went into the bathroom to brush her teeth, she turned on the faucet and discovered that there was no water coming out. She ran into the kitchen and discovered that there was no water coming out of that faucet either. Millie finished getting ready, jumped on her bike, and headed for school.

Picture 2: At the bike rack:
Millie met Mike at the bike rack. Millie said, "Hey, Mike, guess what? We didn't have any water at our house this morning. I had to brush my teeth without water, my mother couldn't make the frozen orange juice, and I couldn't change the water in my goldfish bowl." Mike said, "We didn't have any water either! We couldn't rinse the dishes or anything. I wonder if we will have any water at school?" "I hope so, because I'm thirsty!," said Millie.

Picture 3: In the classroom:
Once in the classroom, Mike and Millie ran to the drinking faucet only to discover that there was no water there either!

They went to tell Mrs. Santos that there wasn't any water at school or at their homes this morning. "Mrs. Santos, Mrs. Santos," shouted Mike and Millie, "We don't have any water in our classroom." Mrs. Santos said, "I wonder what has happened to our water supply. This is something that we need to learn more about! How can we find someone to help us solve this problem?"

OPTIONAL STUDENT INPUT HERE: STUDENTS BRAINSTORM ANSWERS TO THIS QUESTION:

"How can we find someone to help us solve this problem?" Mike suggested that we call the Water Department to see if they can help us. Mrs. Santos sent Mike and Millie down to the school office to call the water department.

RING—RING----"Hello, this is Mrs. Brown at the Water Company, may we help you?" "We hope so! My name is Mike and I go to _____ Elementary School. We don't have any water at our school or at our houses and we were hoping you can help us." "We are glad you called. We had a break in the pipes under the street near your school. We sent a work crew to repair the problem and you should have water at your school soon." Mike says, "I didn't know that there were water pipes under the ground." Then Mrs. Brown said, "Would you like to have some more information on how water gets to your school? We can send our assistant, H_2O, to help you learn more about water."

STORY OPTION 2 STARTS HERE

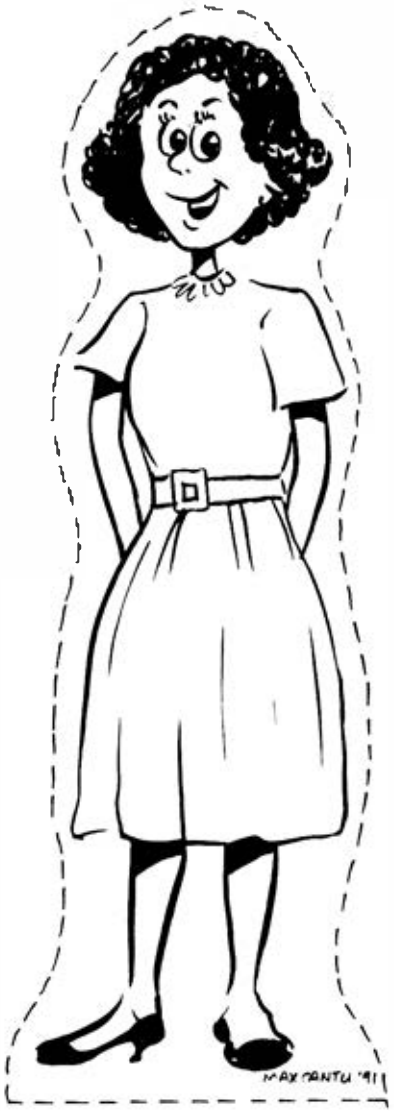
Instructions for the teacher: If you did not use the storyline from option 1, send 2 students to the office to pick up the H_2O Droid that was supposedly sent to the school from the water department. Make a large construction paper tag that says, "From the Water Department." When H_2O arrives in the classroom, the teacher or a student pulls out the previously inserted question strip which will introduce H_2O to the class. (see introductory strip included)

Story Option 1: Flannel board character cutouts.

Phone

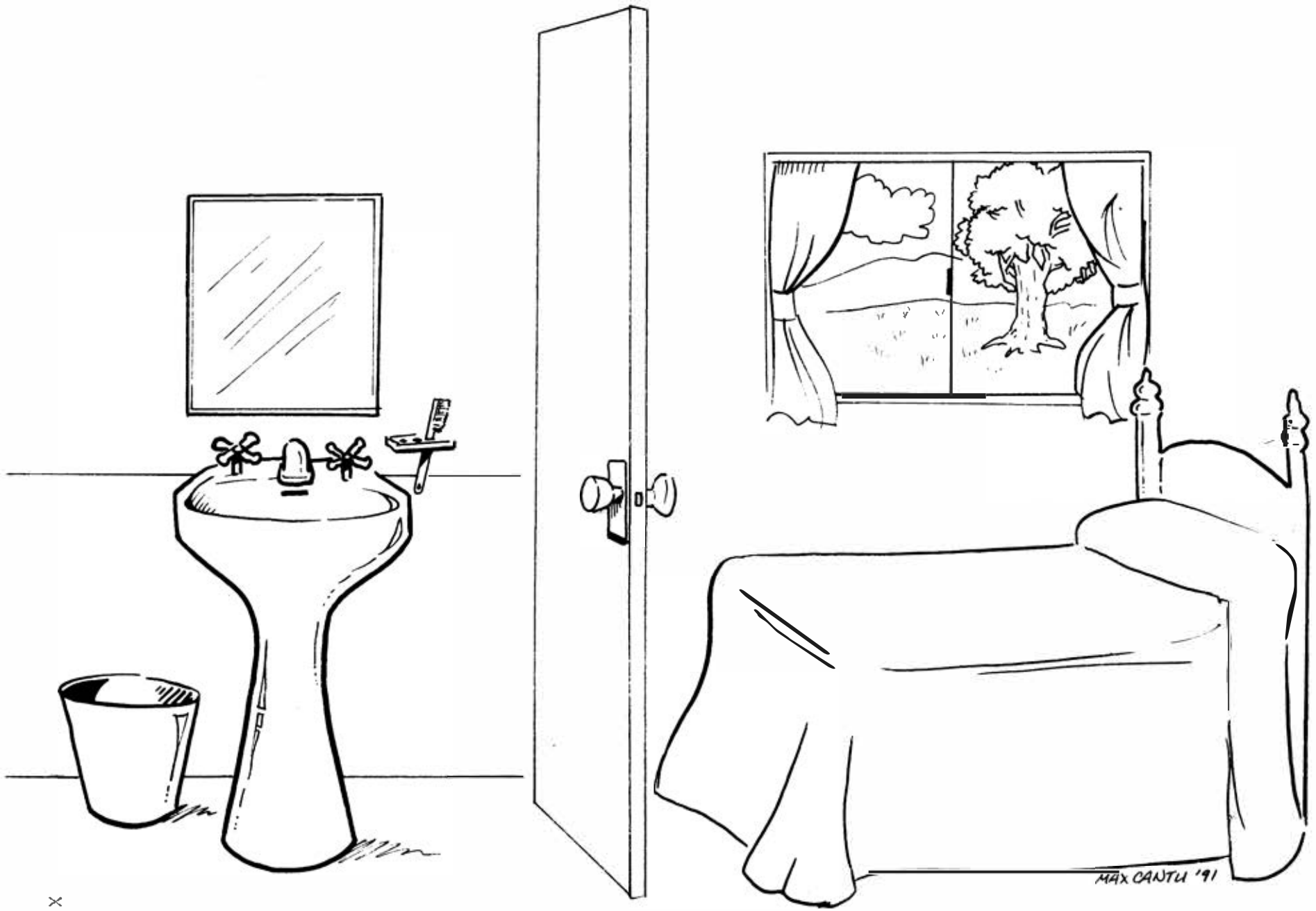
Millie

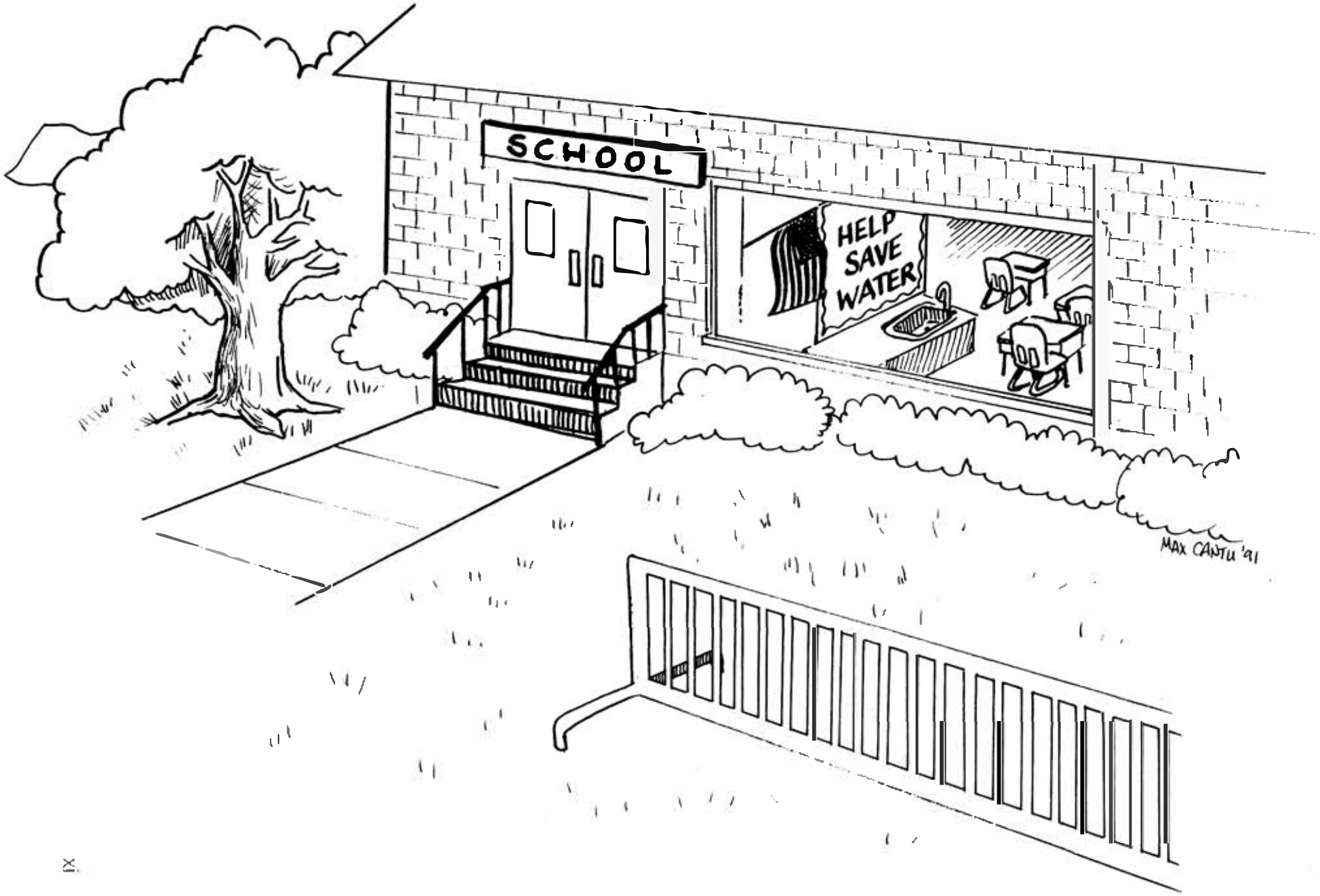
Mike

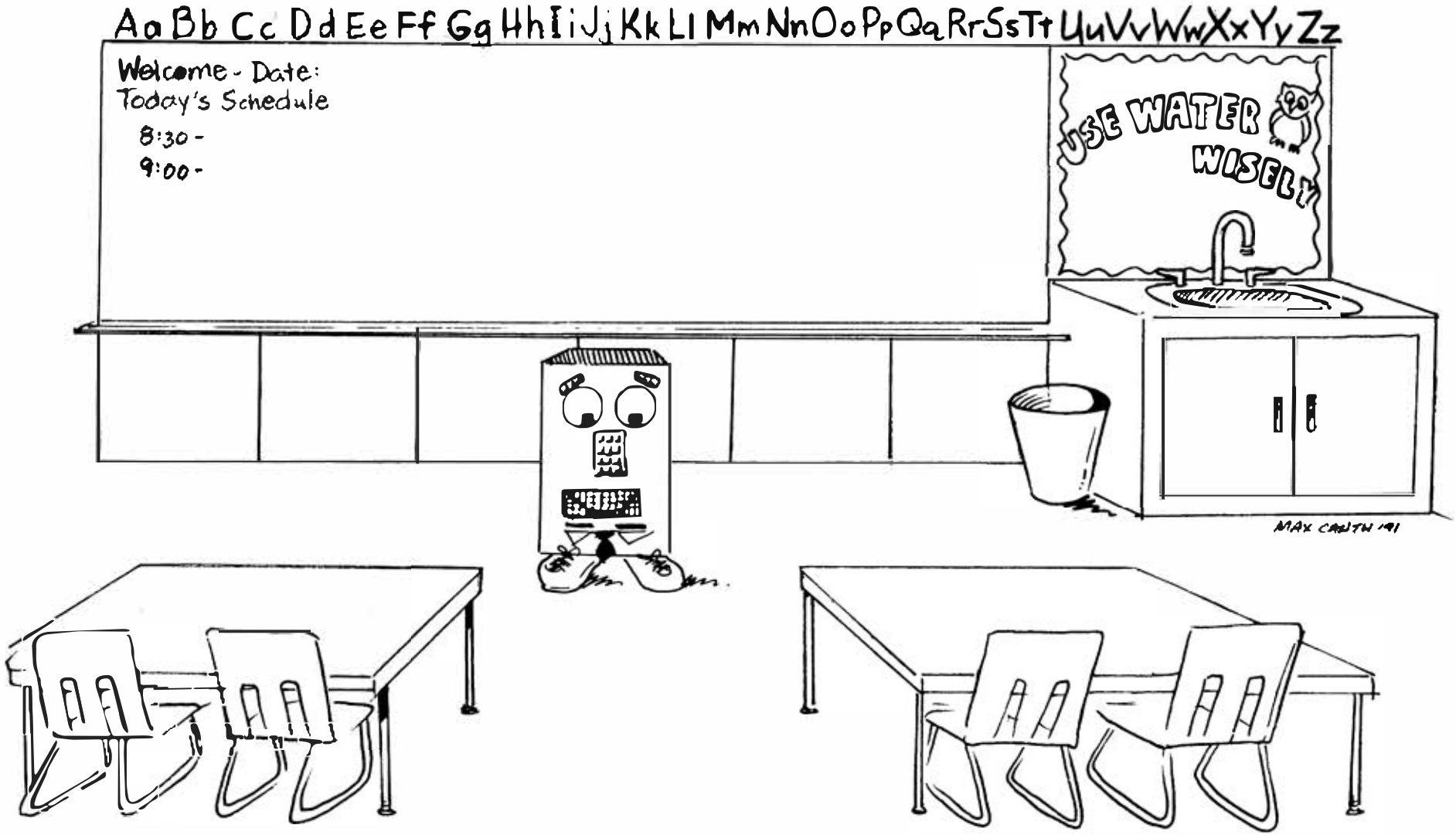


Mrs. Santos

Mrs. Brown

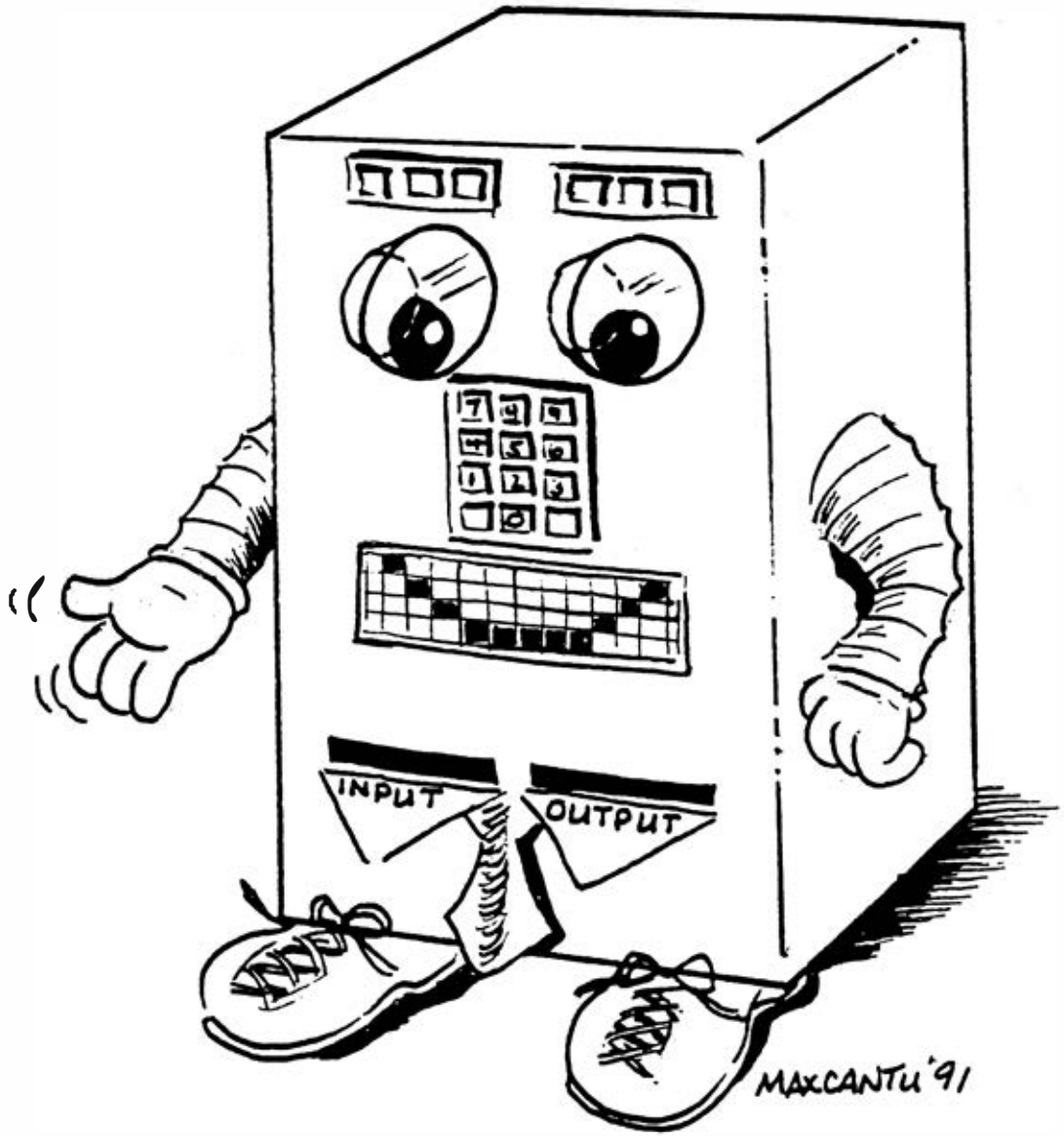

MAX CANTU '91


SCHOOL
HELP SAVE WATER
MAX CANTU '91


Aa Bb Cc Dd Ee Ff Gg Hh Ii Jj Kk Ll Mm Nn Oo Pp Qa Rr Ss Tt Uu Vv Ww Xx Yy Zz
Welcome - Date:
Today's Schedule
8:30 -
9:00 -
USE WATER WISELY
MAX CAUTH '91

Hello, my name is H_2O. The water department sent me here to help you learn more about water. I will give you questions to answer and activities to do.

Here is a picture of me for your notebook cover. That way, we both can keep a record of the answers. Are you ready for your first question?



My Droid Book

Name

PIPES

QUESTION: How does water get to your classroom?

OBJECTIVE: Students will gain an understanding of the path that water takes to get to their classroom.

ACTIVITY: This is an introductory lesson that traces the path of water from natural sources to homes through a system of pipes. Students will make a model using straws as pipes.

EXPECTED OUTCOME: A model will be completed.

CURRICULUM CONNECTION:
Science
Geography
Art

THINKING PROCESSES:
Observing
Communicating
Ordering

BACKGROUND NOTES: Fresh water takes the path from natural sources such as lakes, rivers, streams and ground water to reservoirs or wells and on to water treatment plants. Once the water has been treated and quality checked, it is piped to homes and schools. There are two systems of pipes: the water pipes bringing in fresh water and the sewer pipes taking out the used waste water.

BEFORE YOU START:
1. Use flex straws to represent turns in the pipes.

2. If students are unable to cut straws, prepare straws ahead of time.

MATERIALS:
flex straws
regular straws
white glue
activity sheets
scissors
crayons
Q-tips
tape

PROCEDURES:
1. **Droid Link:** Take the question strip from H_2O..."Hold on to your memory banks, we've got quite a story ahead! How does water get to your classroom?"

2. Ask the question — record all responses on the board.

3. Summarize and discuss how water is transported through pipes to our classroom and homes. The discussion includes the overall picture of where water comes from including the water treatment plant, reservoirs, wells, lakes, streams, rivers, and ground water.

Younger Students — single activity sheet with star in the lower left corner
4. Teacher makes and demonstrates the sample activity sheet as follows:
   a. Using their finger they trace the path that water takes from #1, the cloud, through to #5, the home.
   b. Fold up the bottom ⅓ of the paper along the solid line.
   c. Color the outside of the folded edge to represent grass or the ground.
   d. Glue the flex straw in the pipe area labeled "straw."

Older Students — Two activity sheets with a water drop in the lower left corner.
4. Teacher makes and demonstrates the sample activity sheets as follows:
   a. Using your finger, trace the path that the water takes from the natural sources to the classroom and then to the ocean or lake by following these directions:
      1) Begin by putting your finger on the cloud and following the water to the reservoir/lake, and to the Water Purification Plant. With your other hand, trace the path from the speckled ground layer, up the straw, to the well and into the Water Purification Plant.
      2) From the treatment plant go through the pipes to the buildings.
      3) To follow the path of the waste water, trace the flow from the buildings to the treatment plant using the shaded pipes and then on to the ocean or lake.

b. Fold the paper up on the fold lines.
c. Color the outside of the folded edge to represent the ground or grass.
d. Color the clean water pipe path blue; the used water path is already shaded and flows to the waste treatment plant.
e. Glue the straws on the clean water pipe path only, cutting and using flex straws as needed.
f. Color the rest of the picture (optional).

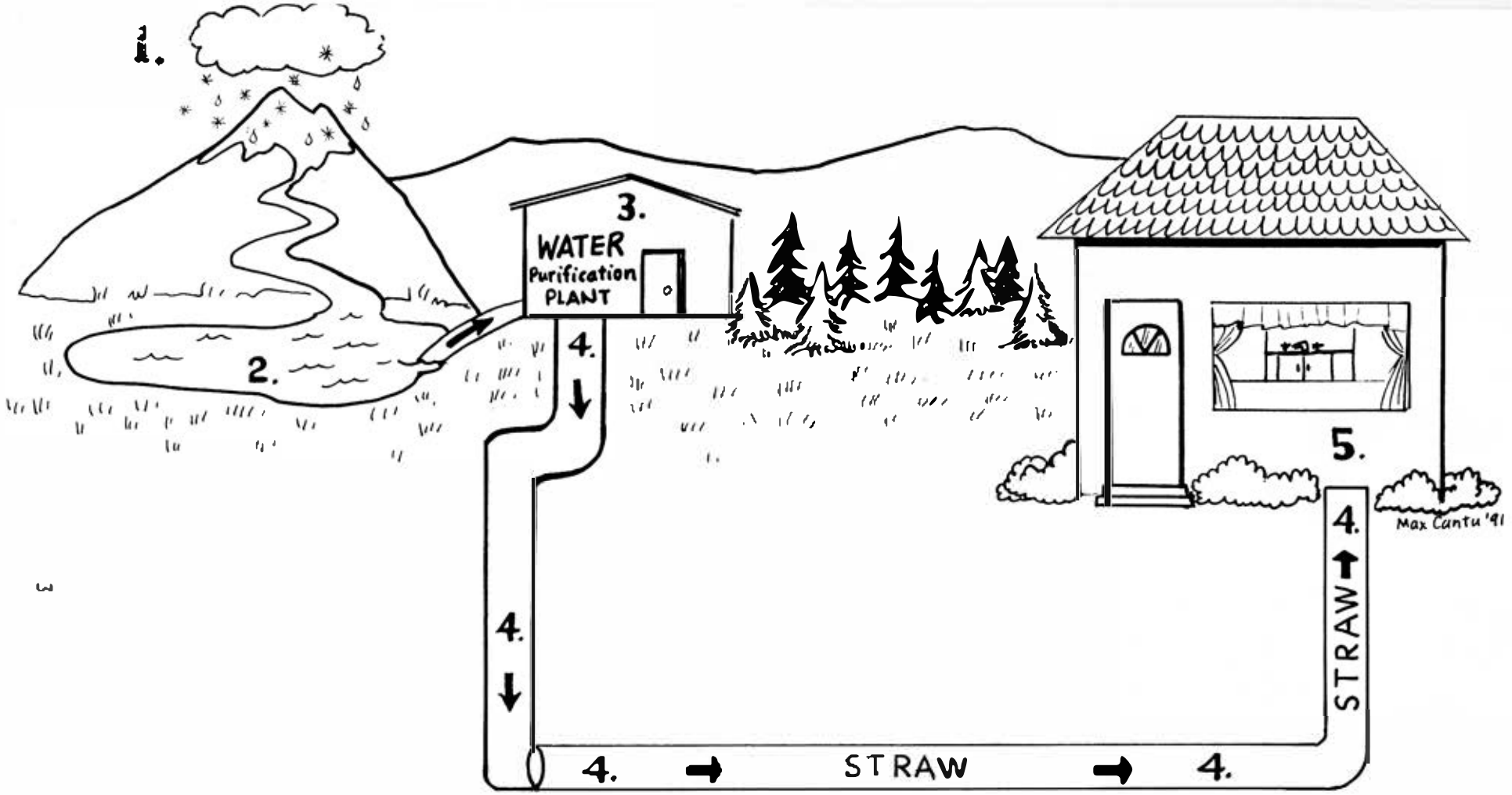
5. Students make the model.

6. Save the completed sheets for reference during remaining lessons.

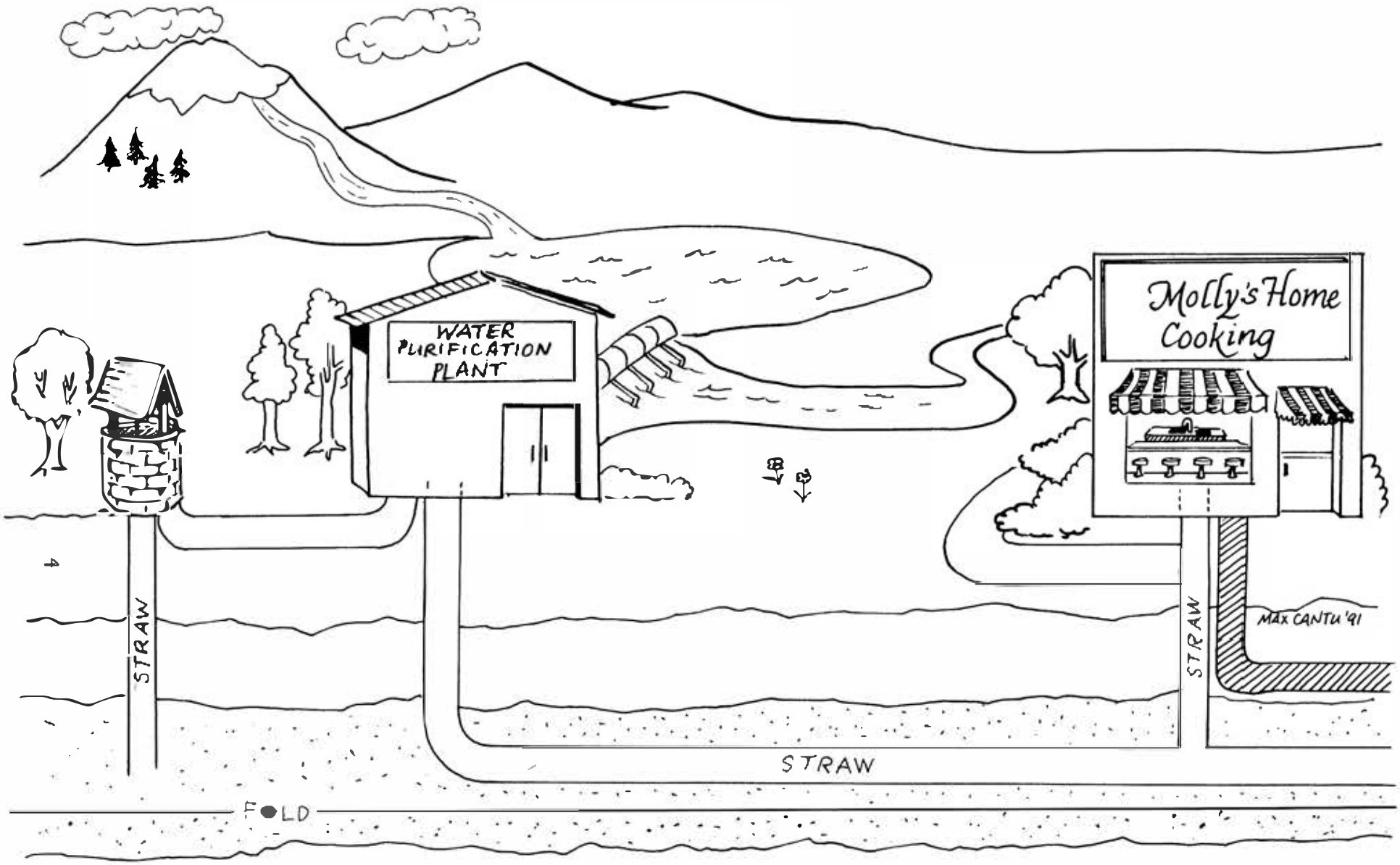
CLOSURE

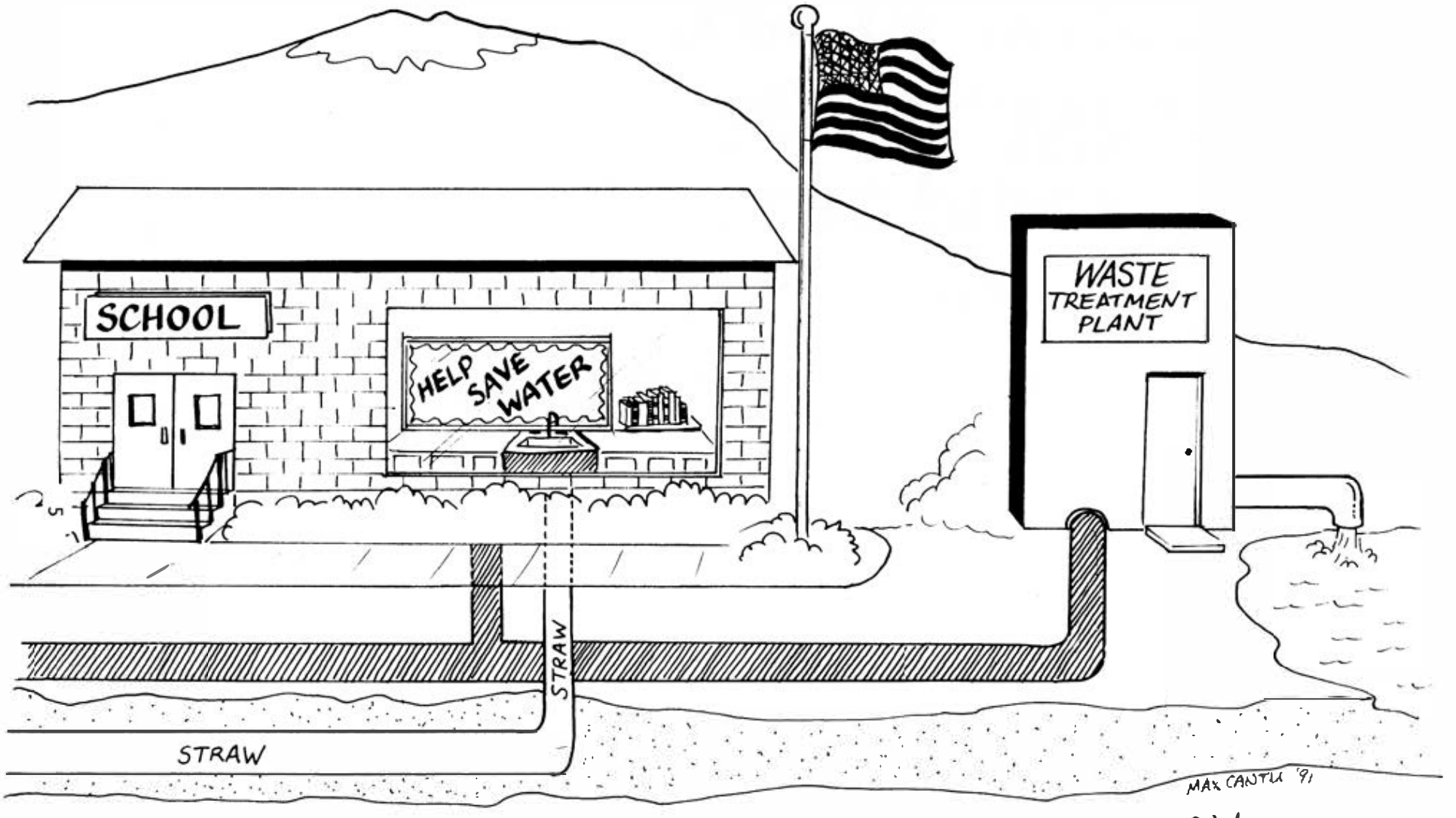
7. Discuss the answers to the question.

8. Write responses on a strip of paper and enter the responses into H_2O and into the Student Droid Notebook.


1.
2.
3.
WATER
Purification
PLANT
4.
4.
4.
STRAW
4.
STRAW
4.
5.
Max Cantu '91

FOLD


WATER PURIFICATION PLANT
Molly's Home Cooking
STRAW
STRAW
STRAW
MAX CANTU '91
FOLD


SCHOOL
HELP SAVE WATER
WASTE TREATMENT PLANT
STRAW
STRAW
MAX CANTU '91

fold

Hold on to your memory banks, we've got quite a story ahead! How does water get to your classroom?

PIPES

Hey kids, have you ever wondered where the water comes from before it gets into the pipes? Well, our question today is...What are the natural sources of water?

LANDFORMS

LANDFORMS

QUESTION: What are the natural sources of water?

OBJECTIVE: Students will identify landforms and the natural sources of water.

ACTIVITY: Students will construct a landform model that will illustrate the movement of water in a natural setting.

EXPECTED OUTCOME: A model will be completed and labeled.

CURRICULUM CONNECTION:
Geography
Science
Music

THINKING PROCESSES:
Observing
Communicating
Comparing
Relating
Applying

BACKGROUND NOTES: Geographic vocabulary covered in this lesson:
Mountain — A huge mass of earth and rock that rises above the low lying land.
Valley — A depression in the land surrounded by hills which usually has a river or stream running through it.
River — A large stream of water flowing over the earth's surface and finaly flowing to the sea.
Glacier — A large body of ice and snow that forms in high mountain valleys.
Lake — A body of water surrounded by land.
Run Off — Water that flows from the land into streams, rivers or lakes.

BEFORE YOU START:
1. There are several ways to construct the landform model. See "Landform Model Alternatives" (included in this lesson).
2. Obtain the plastic containers at a grocery store, salad bar, or bakery, etc.
3. This lesson can be done as a demonstration using much larger amounts of clay and a very large plastic container, aquarium, or plastic shoebox.
4. Note — This model will be used for several lessons. Keep it.

MATERIALS:
Materials will vary depending upon which model alternative is chosen.
plastic containers
aluminum foil (optional)
brown paperbag (optional)
vocabulary flags (1 strip/group)
modeling clay (1 stick per group—1/4 lb.)
song sheet
tape
toothpicks
ice cube

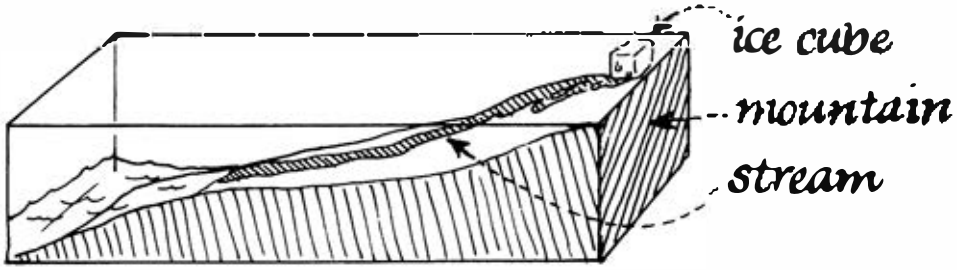
PROCEDURES:
1. **Droid Link:** Take the question strip from H_2O ... "Hey kids! Have you ever wondered where the water comes from before it gets into the pipes? Well, our question today is...what are the natural sources of water?"
2. Ask the question — record responses on the board and discuss.
3. Students will construct a model showing geographic features and the natural sources of water by doing the following:
   a. In the plastic box, mold the paper, foil or other material into the shape of a mountain. Cover with a thin layer of clay.
   b. Then with your finger indent into the clay a river, lake and ocean area. (see illustration)
   c. After constructing the landform model, students will place a large ice cube on top of the mountain. There should be a small indented lake under the ice cube that leads to an indented stream or river.
   d. While the ice is melting, students will cut out the vocabulary flags and affix them to the landforms using a toothpick and tape. (This labeling is optional for younger students.)
4. Record student observations of the landform model as the ice melts.
5. Sing the song, "On Top of My Mountain," to the tune of "On Top of Old Smokey."
6. Save the model for future lessons.

CLOSURE:
7. Review the landforms covered in the lesson by having students remove the vocabulary flags and then replacing them.
8. Using their model, students will describe how water flows from the mountains to the sea.
9. Write an answer to the lesson question, place into H_2O, and record in the Student Droid Booklet.

LANDFORM MODEL ALTERNATIVES

Containers:

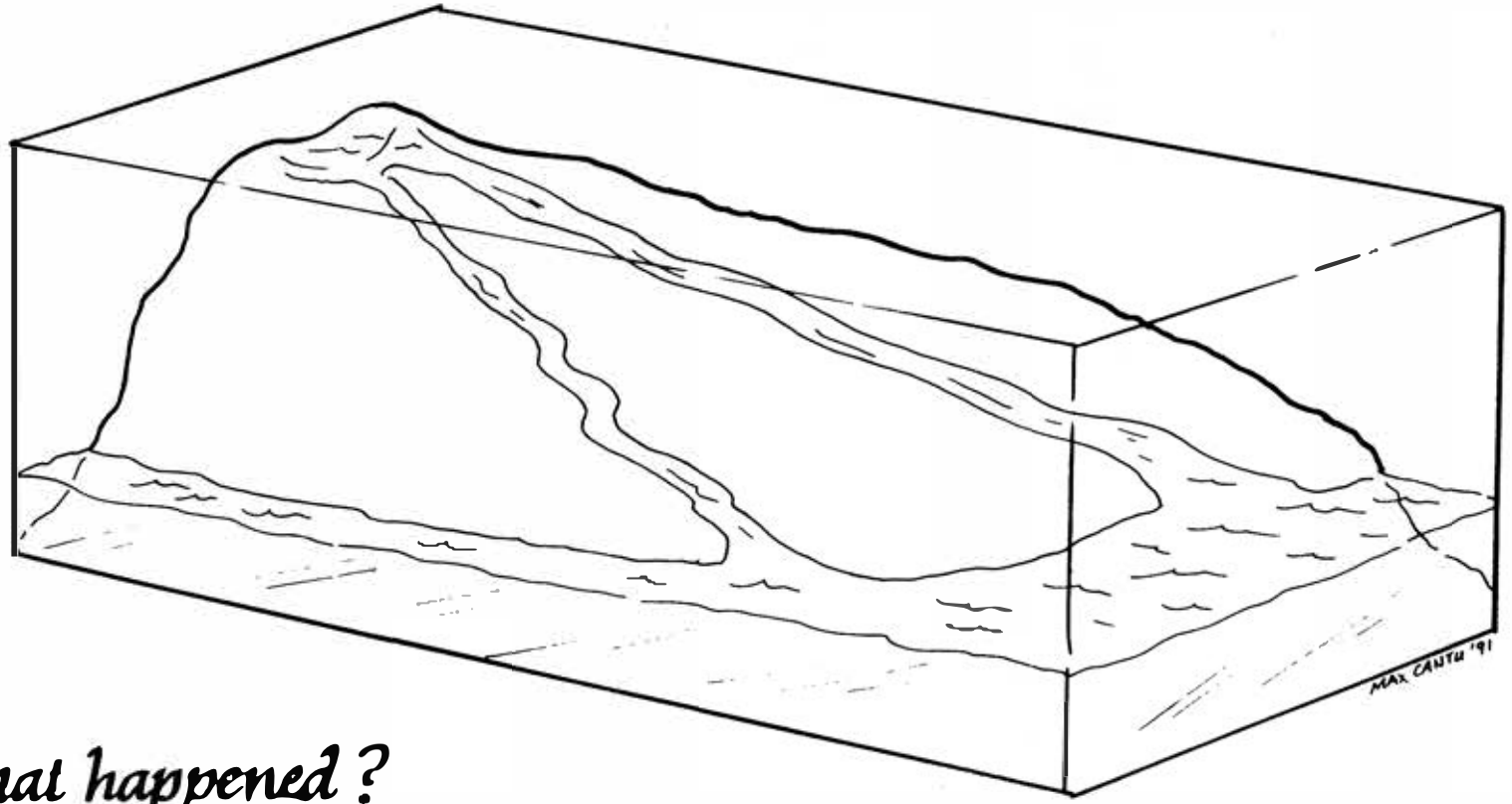
- clear plastic salad containers with a cover.
- see-thru plastic storage containers such as: Rubbermaid brand.
- any deli/bakery aluminum pan with a clear plastic dome lid.
- aluminum foil folded into a pan with a plastic wrap cover.



Landforms

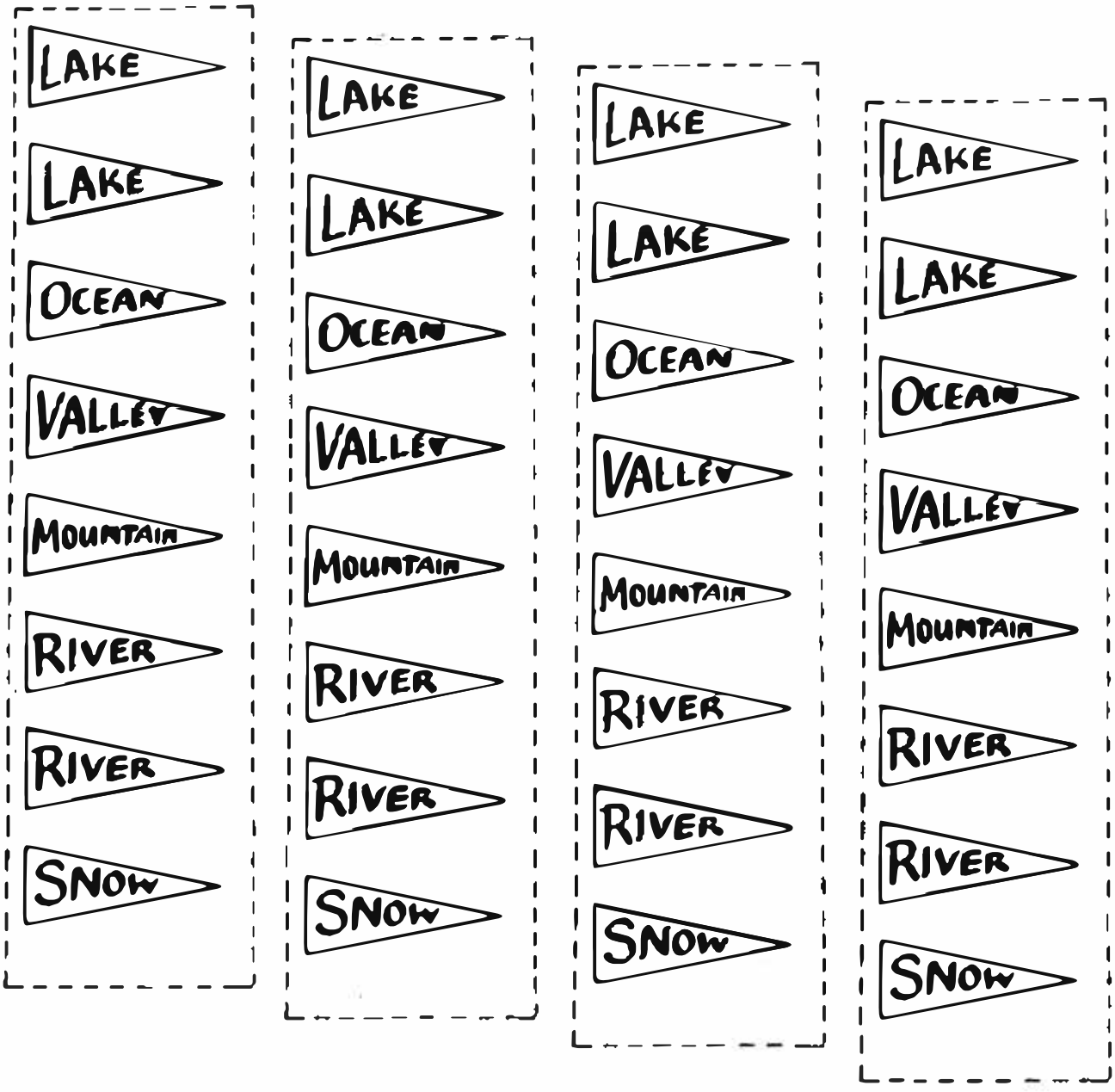
- plasticine clay stretched thinly and then placed over foil or paper that has been molded into a landform base.
- plasticine clay molded into landforms.
- aluminum foil molded into landforms.
- brown grocery bag torn and molded into the landforms.

What happened as the ice melted ?



What happened ?

LANDFORM FLAGS



On Top of My Mountain

On top of my mountain
All covered with snow
The sun warms the cube up
And drops start to flow.

The water rolls down
From the hills to the sea
It gathers in rivers
Just waiting for me.

WATER CYCLE IN A BOX

QUESTION: How does water move from the earth to the clouds and back again?

OBJECTIVE: Students will observe a model of the water cycle.

ACTIVITY: Using the landform model with a lid (from the previous lesson), the students will observe and draw an illustration of the movement of water, called the water cycle.

EXPECTED OUTCOME: The closed system will produce a water cycle.

CURRICULUM CONNECTION:
Geography
Science
Math
Art

THINKING PROCESSES:
Observing
Communicating
Comparing
Relating
Applying

MATH STRANDS:
Measuring

BACKGROUND NOTES: The water cycle has 4 components: evaporation, condensation, precipitation, and accumulation.

1. Evaporation is a phase change from liquid to gas. The number of water molecules that leaves the surface (evaporates) depends on the following variables:
   a. Temperature—the warmer the liquid, the more random motion each molecule possesses and the more likely it is to break from the liquid and be buoyed up by the air.
   b. Wind speed—the higher the wind speed, the greater the chance that water molecules will leave the surface.
   c. Air pressure—greater air pressure will result in less evaporation.

2. Condensation occurs when water molecules cool and pull together into liquid form. In a cloud, water droplets begin to form on specks of cool dust.

3. Precipitation occurs as gravity pulls the water back to earth. Precipitation may be in the form of rain, snow, sleet or hail.

4. Accumulation may be in rivers, lakes, oceans, glaciers, and ground water.

BEFORE YOU START:
1. To accelerate the water cycle in the box, use hot tap water.

2. Instead of the sun, a 100 watt lamp can be used.

3. This lesson can run 2 or 3 days. It can stop after procedure #5, after #6, and/or after #7 (see procedures).

4. You can make flannel board pieces by using the student activity sheet as a pattern. It can be used as is by coloring and laminating them or cut out from felt or cloth.

5. Waxed paper raindrops can be collected in advance by using a paper punch through several layers of waxed paper. This is a more accurate representation of rain than blue paper since water only appears blue due to the effects of light waves.

MATERIALS:
per group:
Landform model (from previous lesson)
lid for model or plastic wrap
1/2 cup water
4-5 ice cubes in a baggie
waxed paper for raindrops
crayons
glue
cotton
flannel board pieces
water cycle labels
18x12 construction paper
blueberry Kool-Aid
scissors

PROCEDURES:

1. **Droid Link:** Take the question strip from H_2O ... "Hi there! Rainy days are a part of our story for today.. How does water move from the earth to the clouds and back again?"

2. Pose the question and discuss the responses listing key words given by the students: rain, snow, evaporation, ...

3. Teacher demonstrates: "Let's put the water back into the ocean (lake) in our mini earth model." Teacher places 125 ml of warm water into the container and continues, "Then we'll put a lid on the model to keep the water inside, and finally, we'll place the model in the sun and observe."

4. Students will follow the same procedure and place their models in the sun or under a light and observe periodically.

5. Half an hour later: (approx) — students observe the water cycle in their mini earth models. Discuss what they see (cloudiness). Then add a baggie of ice to the top of each model. Continue to observe, noting that adding the ice is like the clouds being cooled when they are high in the air.

6. Return to the classroom to discuss what they saw (cloudiness, rain). The teacher uses the flannel board pictures to connect their observations in the container to the various steps in the water cycle. Emphasize evaporation, condensation, precipitation, and accumulation using the water cycle labels.

CLOSURE:

Younger Students

7. Students complete an art activity as follows:
   a. On construction paper, students construct a model of the water cycle using the patterns from the flannel board pictures.
   b. Cut out, color and glue all parts in the correct locations.
   c. Glue cotton onto the clouds — darken cloud #2 using a black marker.
   d. Cover the lake and river with glue and sprinkle with Blueberry Kool-Aid.
   e. Cut out raindrops from waxed paper and glue down.

Older Students

7. Student may draw pictures instead of cut-outs for the art page or use the additional "Water Cycle Strip" page. (See below for specific instructions.)

8. Using their art page, students can trace with their fingers the path of the water cycle as the teacher shows each water cycle label.

9. The class determines an answer to H_2O's question and records on a paper strip. They give it to H_2O and record it in their Student Droid Booklet.

Instructions for the "Water Cycle Strip" page .

1. Cut off the cloud strip and precipitation strip from the picture/text page.

2. Cut slits 1, 2, 3, and 4.

3. Weave the paper strips through the slits to show the water cycle and how the clouds move and then precipitate. The precipitation strip weaves vertically through slits 1 and 2. The cloud strip weaves horizontally through slits 3 and 4.

Water Cycle Labels

WATER CYCLE

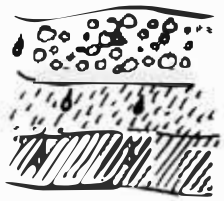
PRECIPITATION

(rain, hail, sleet, snow)

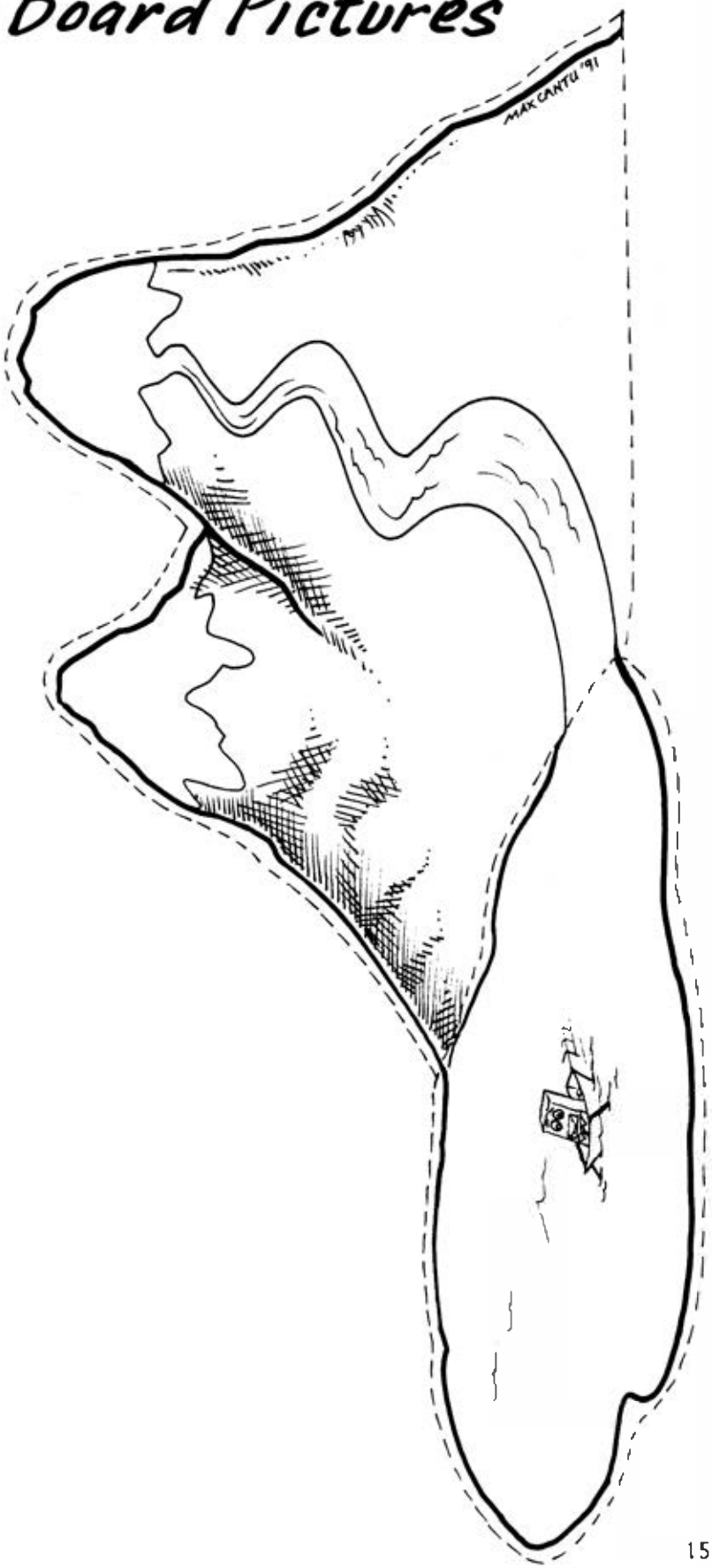
CONDENSATION

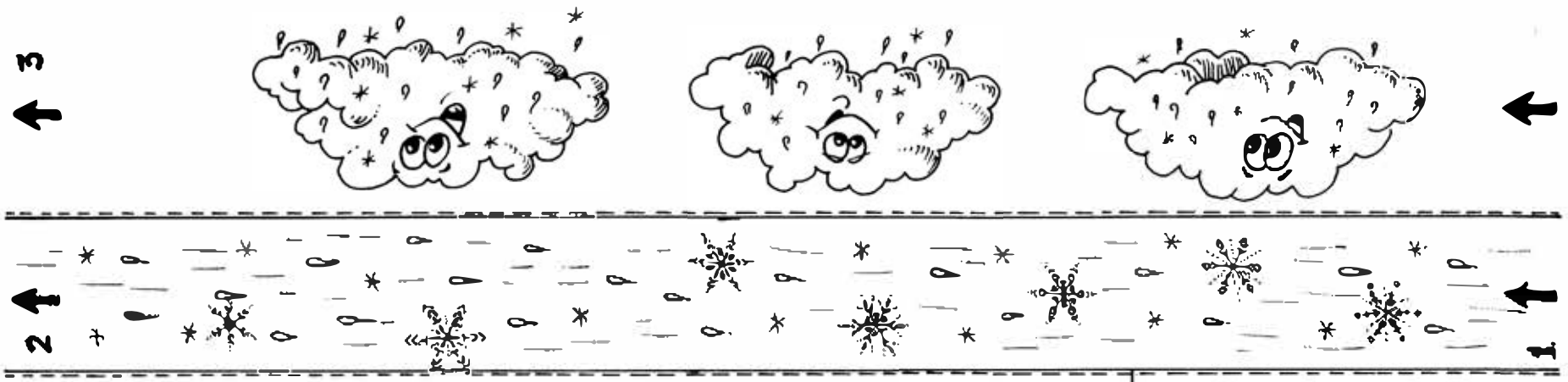
EVAPORATION

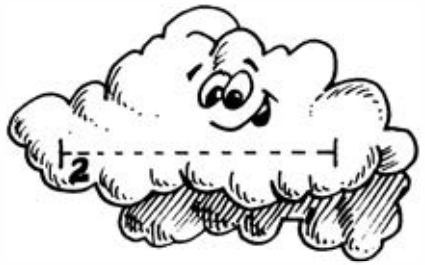
ACCUMULATION



Flannel Board Pictures



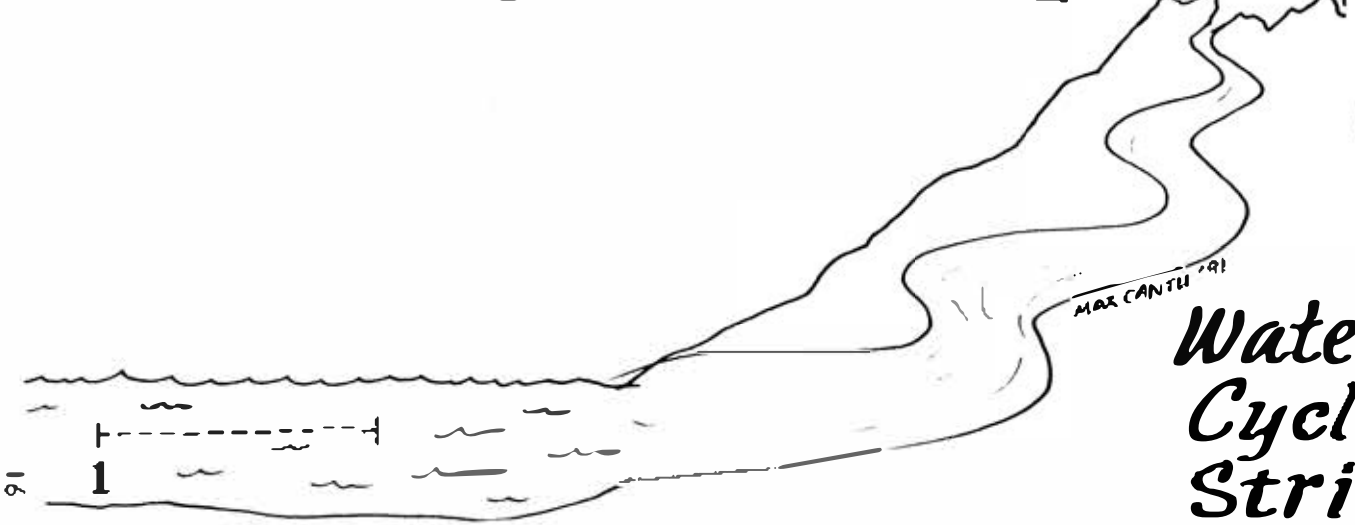




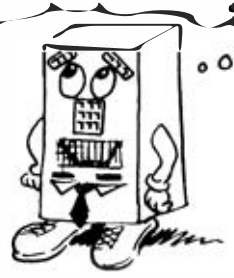
3

4

The wind blows the clouds across the sky. Some clouds are filled with water and fall to the earth as rain or snow. The water then moves down the streams to the lakes or the ocean. Some of the water soaks down into the ground.



Water Cycle Strip



Hi there! Rainy days are a part of our story for today. How does water move from the earth to the clouds and back again?

WATER CYCLE IN A BOX

How does water move from the earth to the clouds and back again? I know when it does, I need a big umbrella to protect my circuits!

WATER CYCLE IN A CUP

WATER CYCLE IN A CUP

QUESTION: How does water move from the earth to the clouds and back again?

OBJECTIVE: Students will observe a model of the water cycle.

ACTIVITY: Using a cup covered with plastic wrap, the students will observe the movement of the water in the water cycle and sing the "Water Cycle" song.

EXPECTED OUTCOME: The closed system will produce a water cycle in which the "LATER" cup will have a foggy appearance due to condensation.

CURRICULUM CONNECTION:
Science
Math
Geography
Music

THINKING PROCESSES:
Observing
Communicating
Comparing
Relating
Applying

MATH PROCESSES:
Measurement

BACKGROUND NOTES: In this activity, the water cycle occurs in a closed system (a cup). See background notes in the "Water Cycle" lesson.

BEFORE YOU START:
1. Each "Landform Background Strips" page is enough for 4 students.
2. The teacher may want to record the process on a class chart rather than on individual student worksheets.

MATERIALS:
per student
9 oz. clear plastic cup
plastic wrap
landfonn cutout
60 ml hot tap water
tape
record sheet

PROCEDURES:
1. **Droid Link:** Take the question strip from H_2O ... "How does water move from the earth to the clouds and back again? I know when it does, I need a big umbrella to protect my circuits."
2. Pose the question from H_2O and discuss the responses listing the key words given by the students: rain, snow, evaporation, etc.
3. Teacher demonstrates by saying, "Let's create a model of our earth by taping the landform drawing to the back of your cup." Students will tape the drawing onto their cups.
4. The teacher demonstrates: "Let's add (hot tap) water to the earth cup; 60 ml will be just right. Now, cover the cup with plastic wrap to keep all of the water from evaporating out of the cup." Students add cover.
5. Use the class record sheet to have students draw, with a blue crayon, the actual level of the water in the cup labeled "NOW."
6. Place the cups outside in the sun or under the heat of a 100-150 watt lamp for ½ hour.
7. Go outside to observe any changes at the end of the ½ hour. Cups may be brought inside or remain outside depending on how fast evaporation occurs. Students should record their observations on the "LATER" portion of their record sheet by using a blue crayon to show where the actual water level, water drops and condensation are in the "LATER" cup.

CLOSURE:
8. Discuss the path of the water cycle with the students using the water cycle labels from the "The Water Cycle in a Box" lesson. Note: Shake or tap the cup to show this path.
9. Students will fill in the words, "Water Cycle," on their record sheet.
10. Sing the "Water Cycle Song" to the tune of "Where, Oh Where, Has My Little Dog Gone?"
11. The class detennines the answer to H_2O's question and records it on a paper strip. Enter the paper strip into H_2O and have students record their answers in their Student Droid Booklet.

Landform Background Strips

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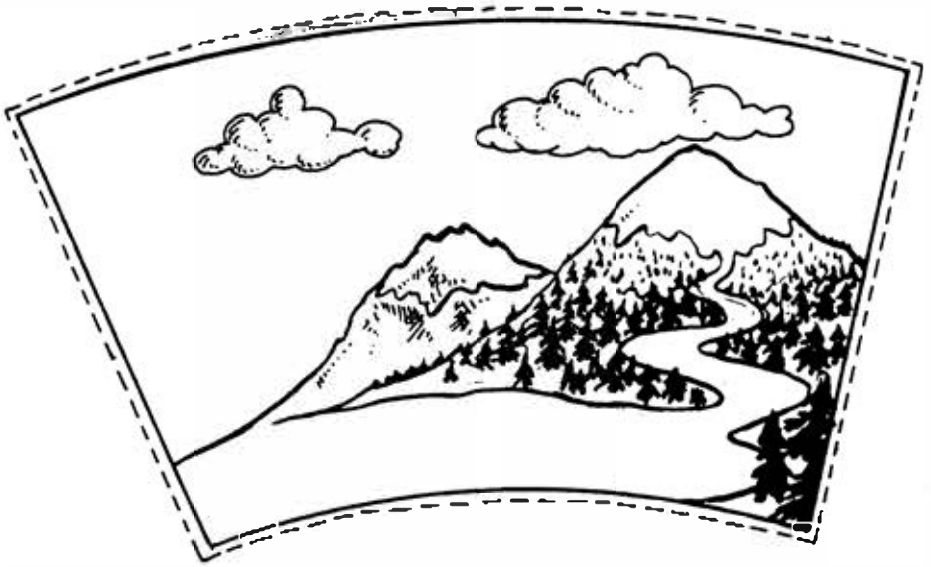

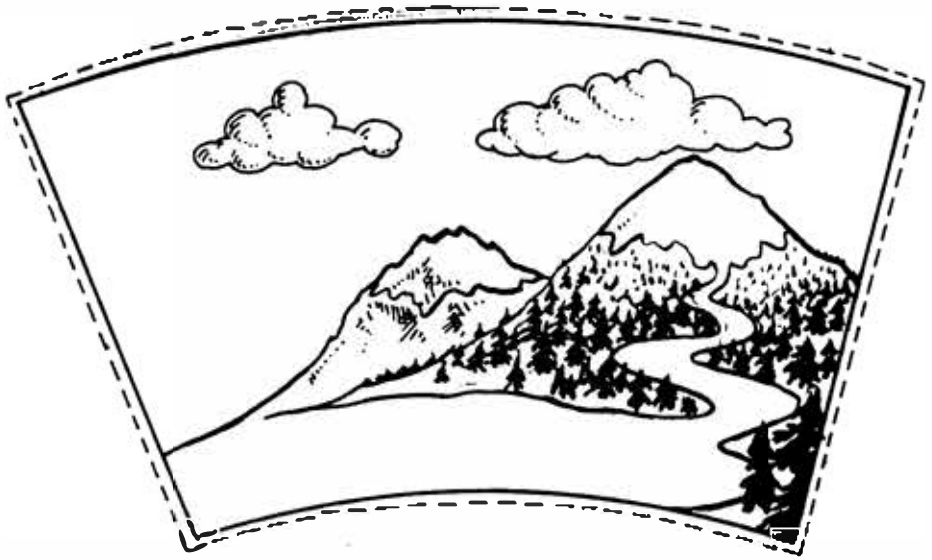

Water moves from the earth to the clouds and back again. It is called the _____ _____.

NOW

LATER

Water Cycle Song

Where, oh where, does the water come from?
Oh where, oh where, could that be?
As the sun shines down, it heats up the sea,
And evaporates above me.
Where, oh where, does the water come from?
Oh where, oh where, could that be?
As the water cools down, it groups all around,
And condenses to clouds above me.
Where, oh where, does the water come from?
Oh where, oh where, could that be?
It precipitates down — onto the ground,
And rolls on back to the sea.
When the clouds come to town — the water falls down,
And gathers in streams, lakes, and sea.
It accumulates down — deep in the ground
'Til it's pumped through the pipes back to me.

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GROUND WATER

QUESTION: What is ground water?

OBJECTIVE: Students will gain an understanding of how water percolates through the earth and gathers as ground water.

ACTIVITY: The teacher will demonstrate how ground water accumulates below the ground by making a simulated cross-section of the ground.

EXPECTED OUTCOME: The completed model will have most of the water accumulated at the bottom of the jar.

CURRICULUM CONNECTION:
Science
language
Math—Sequencing

THINKING PROCESSES:
Observing
Comparing
Communicating

MATH STRAND:
Patterns & Functions

BACKGROUND NOTES: A well is a hole in the ground from which a fluid (water) can be withdrawn. Wells are dug in the earth until they reach the aquifer or ground water. The aquifer is the zone where the soil is saturated with water. Rain water reaches the aquifer as it percolates through soil layers until it reaches the aquitard, a layer of clay or compacted shale that prevents further movement of water. Sometimes the aquitard is punched through, and the water below is the deep pure water used. In some areas, the aquitard is near the surface and the water table is not very deep. In other areas ground water could be 1,000 feet deep. As water percolates through layers of soil and sedimentary rock (sandstone), it becomes purified. The layers used in this lesson are soil, sand, gravel, rock, and clay.

BEFORE YOU START:

1. Do not pre-make the model. Make the layered model in front of the students so they can observe the layers.
2. Save the demo ground water model for use in the "Ground Water Pollution" lesson.

MATERIALS:

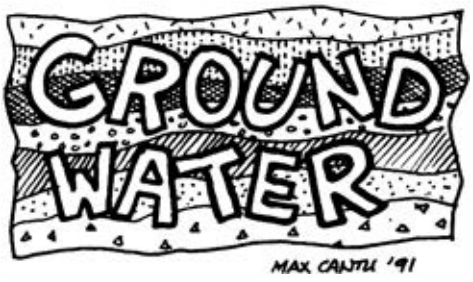
1 — plastic cup with several pin holes in the bottom
1 — tall clear tumbler or 1 2-liter soda bottle with the top cut off and the base removed
1 cup each — soil, gravel, rocks (approx. 1" size)
8 oz. of water
Modeling clay (tennis ball-sized lump)

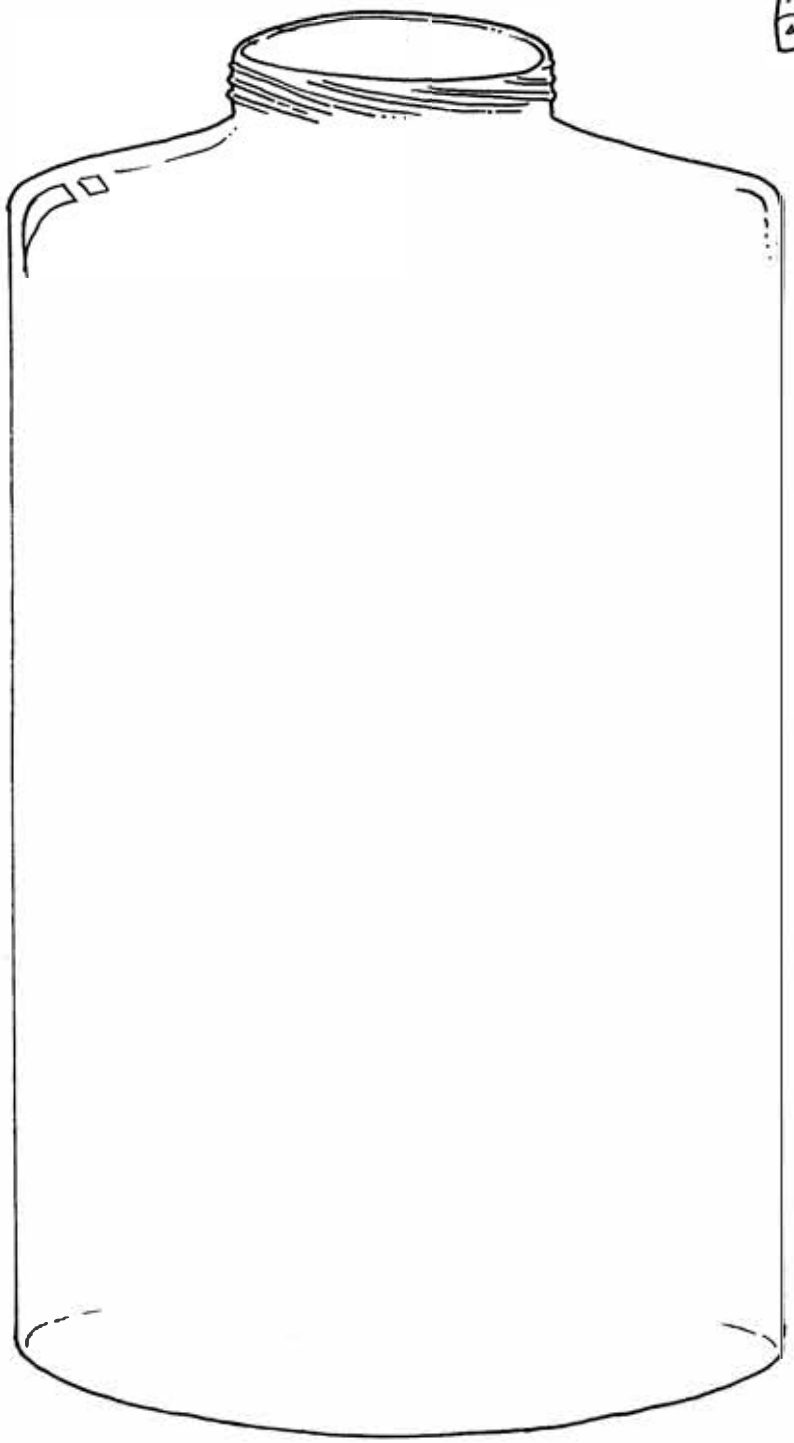
PROCEDURES:

1. **Droid Link:** Take the question strip from H_2O and read it to the class ... "Have you ever wondered where the water that soaks into the ground goes? Well, here is today's question: What is ground water?"
2. Discuss what ground water is and begin the demonstration.
   a. Show the class an empty tumbler or 2-liter bottle.
   b. Flatten the modeling clay and place it in the bottom of the bottle. This will be the aquitard. (see Background)
   c. Pour in 1 cup of rocks, then the gravel, sand, and soil. The bottle should be nearly filled. Discuss that this model represents the earth's layers.
   d. Get a plastic cup (with pin holes in the bottom) and hold it above the bottle. Pour 8 oz. of water into the cup and let it "rain" onto the top soil layer.
   e. Observe the water as it flows through each layer. Discuss that the water accumulating in the bottom of the bottle is called ground water.
3. Distribute the activity sheet "Ground Water." Note: This page could be done as you are pouring in each layer or done after the demonstration is complete. Students will draw the layers of "clay — rock—gravel—sand—soil" and then label the layers with the bottom label being "clay." (sequencing) Color the ground water accumulated in the rock layers blue.
4. Students will cut out the cloud rectangle on the bottom of the page and glue it onto the top of the page above the bottle. This will represent rain in this illustration.

CLOSURE:

5. Review the flow of water in the model. Fill out an answer strip that lists the layers water travels through as it reaches the ground water. Enter the answer strip into H_2O and record in the Student Droid Booklet.





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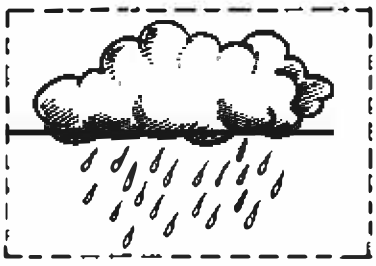


Have you ever wondered where the water that soaks into the ground goes? Well, here is today's question: What is ground water?

GROUND WATER

Well, well, well, Hi again! I was wondering if you could tell me, how do we get water out from under the ground?

WELLS

WELLS

QUESTION: How do we get water out from under the ground?

OBJECTIVE: Students will demonstrate their understanding of how wells pump water from the ground.

ACTIVITY: Students will make a model of a well which simulates the removal of water from beneath the ground or the "aquifer." The younger students will make a picture of a well and the different layers of the earth below the ground.

EXPECTED OUTCOME: Most but not all of the water will be pumped out of the ground well model.

CURRICULUM CONNECTION:
Science
Math—telling time, measuring
Art

THINKING PROCESSES:
Observing
Relating
Communicating

MATH STRAND:
Measurement

BACKGROUND NOTES: Wells — see background information in the "Ground Water" lesson.

BEFORE YOU START:

1. If the "Ground Water" lesson has been presented, the teacher can refer to it rather than doing another demo. However, for efficient pumping of the water in the cup, use different size rocks rather than sand. The sand can clog the straw and make it difficult to trap water.

2. Save this set-up for the lesson on "Ground Water Pollution."

3. Teachers may want to copy the Younger Student's "Wells" page onto construction paper rather than the lighter ditto paper and precut the straws to fit the illustration.

MATERIALS:

For Teacher Demo
1 — 9 oz. cup or jar
1/4 cup large rocks, rinsed well
1/4 cup small rocks, rinsed well
1/3 cup water
1 clear, plastic straw

Younger Students — per student
1 — "Wells" ditto
1/4 cup puffed corn
1 flex-straw
1/4 cup puffed wheat
glue

Older Students — per student
1 activity sheet, "Wells"
2 — 9 oz. tumbler cups (1 for rock layers and 1 for pumped out water)
1/2 clear straw or 1 eye dropper
1/4 cup large rocks — (be sure to rinse the rocks until the water runs clear)
1/4 cup small rocks
clock
tape

PROCEDURES:

1. **Droid Link:** Take question strip from H_2O ... "Well, well, well, Hi again! I was wondering if you could tell me how do we get water out from under the ground?"

2. The teacher reviews what happens in the water cycle. Focus on the accumulation step of the cycle. Remind the students that water from the rain, melting snow pack, and runoff trickles down and is trapped in the rock layers below the surface.

3. The teacher demonstrates (or refers to the lesson "Ground Water" if it was already taught) and begins to build the model of the layers under the ground as follows:
   a. Place ¼ cup of large rocks and ¼ cup of small rocks (prewashed) into a 9 oz cup. NOTE — be sure a straw is placed next to the wall of the cup BEFORE the rocks are put into the cup so that the water may be removed or "pumped up" more easily.
   b. Pour or sprinkle (from a paper cup with pin holes in it) ⅓ cup of water over the rock layers in the cup. Discuss with the class where the water accumulates.
   c. Remove the water by using the straw. Place a finger over the top of the straw which should trap some water into the straw.
   d. Release your finger from the top of the straw to remove water into the second 9 oz. "pumped water" cup.
   e. Discuss how this simulates a well by explaining how a machine called a pump is used to get to water up from the ground.

Younger Students

4. Distribute copies of "Wels" ditto and demonstrate how to make the well picture as follows:
   a. Trace the word "well" to label the picture, then fold the paper in half so it will be freestanding.
   b. Glue the straw onto the ditto between the dotted lines bending it at the top through the well house.
   c. Glue the puffed wheat and corn onto the paper in layers which represent the different layers of the earth.

CLOSURE:

5. Students build their own well and describe how it works.

6. Answer H_2O's question and enter it into the droid and the Student Droid Booklet.

Older Students

4. Groups of 2-4 students will prepare a cup with rock layers similar to the teacher demo using ½ cup of water (125 ml).

5. Distribute the activity page. Students draw a picture of the rock layers and accumulated water onto the cup on the activity page. Have them use a blue crayon to represent the water that accumulated under the ground.

6. Prepare a cup to "measure" the amount of water that was "pumped out" by cutting out the "measuring strip" on the activity sheet. Tape it to the back of a clear, plastic 9 oz. cup so that the measurements face inside the cup.

7. The groups should record their "starting time" and begin "pumping" the water out of their well using a straw as demonstrated by the teacher. Each student takes 3 pumps and passes the "straw pump" to the next student.

8. Place the water that is "pumped out" into the "measuring cup."

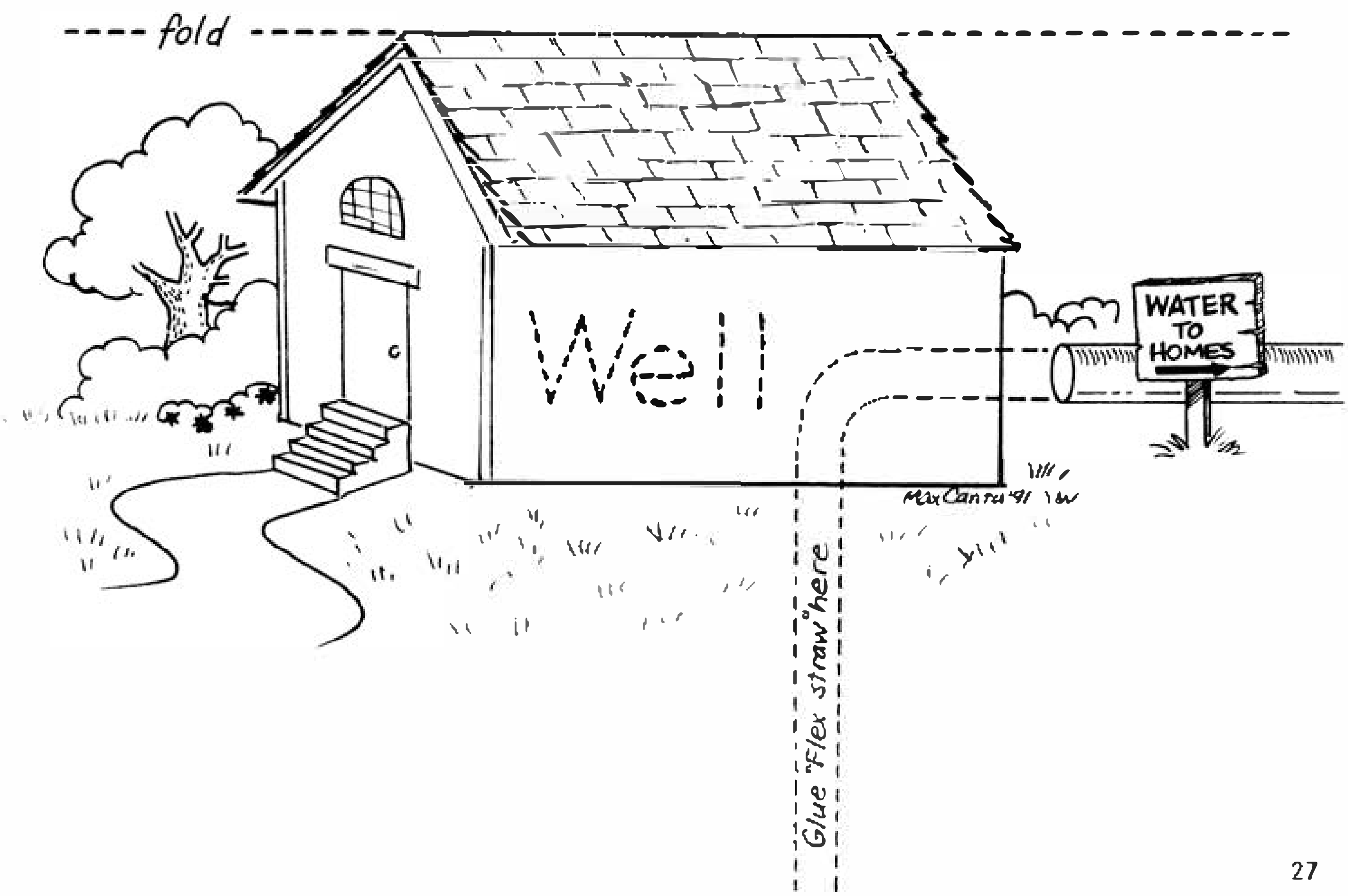
9. At the end of 3 minutes, the groups mark the time on the "stop" clock and record the number of milliliters of water collected.

CLOSURE:

10. Discuss how the water accumulated and how it was pumped out.

11. Answer H_2O's question and enter it into the droid and Student Droid Booklet.

Name ______________________

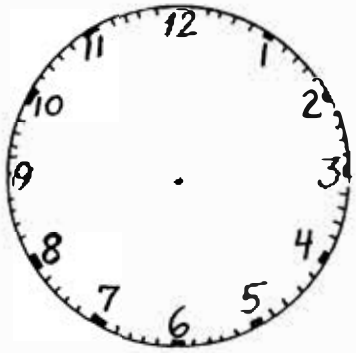


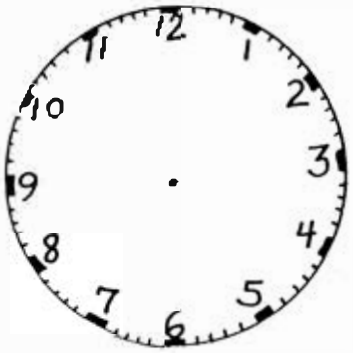
How much water can be pumped out of the rock layers in 3 minutes ?

DRAW WHAT YOU SEE IN THE TEACHER'S CUP.

1. We poured _____ ml into the rocks.

Draw the minute hand onto the clocks.

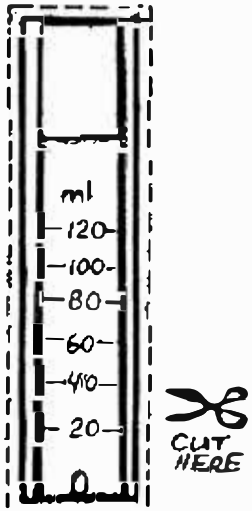




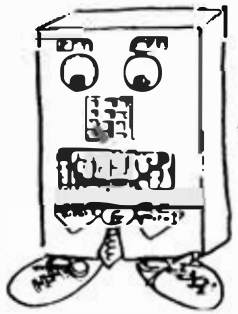
Starting time: _____ stopping time: _____

2. We pumped out _____ ml of water.

CUT OUT THIS STRIP TO TAPE ON YOUR CUP.



3.



HOW MUCH WATER IS LEFT IN THE ROCK LAYERS?

_____ ml

FILTERING WATER THROUGH THE EARTH

QUESTION: How is water filtered through the earth?

OBJECTIVE: Students will observe how water is filtered in nature.

ACTIVITY: Students will filter dirty water by making a gravel and sand filter system.

EXPECTED OUTCOME: The dirty water will be moderately cleaned by the filtering process.

CURRICULUM CONNECTION:
Science

THINKING PROCESSES:
Observing
Communicating
Comparing
Applying

BACKGROUND NOTES: Water percolates through layers of sedimentary rock until it reaches the water table (aquifer). As the water passes through porous rock, it is filtered and purified.

BEFORE YOU START:

1. To make the dirty water, use approximately 1 tsp. dirt in 2 liters of water. Be sure there are also twigs and leaves in the water. (Potting soil works well.)
2. Teacher may choose to punch the 10 holes in the 9 oz. cups in advance using a push pin.
3. Rinse the sand and gravel before using as a filter.
4. Be sure to keep the ground water materials for use in the "Ground Water Pollution" lesson.

MATERIALS:

per group
1 — 9 oz. clear plastic cup
1 — 10 oz. clear plastic cup
clean sand — ½ cup (available at a hardware store)
clean gravel — ½ cup
1 push pin
½ cup of dirty water

PROCEDURES:

1. **Droid Link:** Take the question strip from H_2O ... "Boy, water sometimes gets really dirty! How is water filtered through the earth?"
2. Show the bottle of dirty water. Have the students color in the dirty water cup on the activity sheet to record their observations of the dirty water.
3. Discuss that the ground water found in wells has been filtered by the earth's layers of soil, sand, and rock (sedimentary rock).
4. Tell students that they are going to build a model that shows how water is filtered by the earth.
5. Give each group ½ cup of dirty water, a 9 oz. clear cup for the filter cup, and a 10 oz. clear cup as a gathering cup.
6. Use a push pin to poke 10 holes into the bottom of the filter cup.
7. Using sand and gravel (pre-rinsed) students will layer their filter cup. Allow each group to design their own layering systems encouraging experimentation for varied results. Students record their layers on the "My Filter" space on the activity sheet.
8. Place the filter cup into the gathering cup as illustrated and slowly pour the dirty water through the filter.
9. After filtering the water, students will draw the results into the bottom gathering cup in the "After" section.

CLOSURE:

10. Students will write a sentence in the lines on the bottom of the page that summarizes the activity, i.e., "We filtered water through sand and gravel."
11. Record an answer to the question on a strip and enter it into the droid, H_2O, and record in the Student Droid Booklet.

NAME _____

FILTERING WATER through the Earth

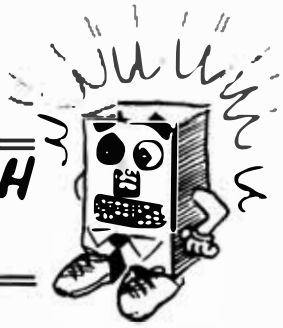
MAX CANTU '91

BEFORE

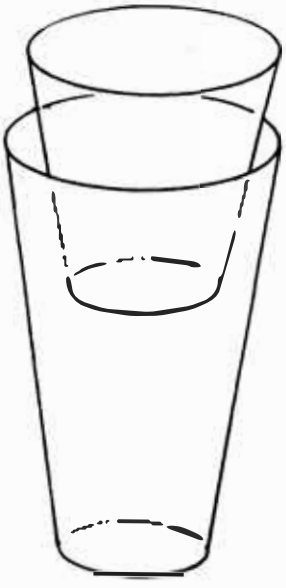
"DIRTY WATER"

"MY FILTER"

AFTER



WATER FILTERED THROUGH THE EARTH.



WHAT HAPPENED TO THE WATER?

Boy, water sometimes gets really dirty! How is water filtered through the earth?

Here's a real experiment to do — How well do different materials filter water?

FILTERING DIRTY WATER

QUESTION: How well do different materials filter water?

OBJECTIVE: Students will begin to learn about the scientific method by testing a variety of filter materials to see how well they filter dirty water.

ACTIVITY: Students will test three materials to determine which one will filter dirty water the best.

EXPECTED OUTCOME: The results will vary. The coffee filtered water should be the cleanest.

CURRICULUM CONNECTION:
Science

THINKING PROCESSES:
Observing
Comparing
Communicating
Ordering

BACKGROUND NOTES: Filtration occurs when water is passed through a filter and the suspended particles do not pass through the filter. In this activity, cloth, paper towel, and coffee filters are used to filter the water. The tightness of the weave of the material will control the amount of suspended matter that passes through it. Coffee filter paper will have tightly woven material and should be the most efficient filter. Different water districts may use varied filtering methods. Contact your local water district for specific information.

BEFORE YOU START:

1. This lesson is appropriate as a Science Fair Investigation because it includes a variable experiment.
2. Premix a large container of dirty water for all groups to use.
3. Students should work in groups of 3 or 4.

MATERIALS:

per group

3 plastic or paper cups
scissors
1 container of dirty water (1 tsp. of soil stirred into 10 oz. or 300 ml of water)
1 piece of cloth
1 coffee filter
1 paper towel
glue

PROCEDURES:

1. **Droid Link:** Take the question from H_2O, ... "Here's a real experiment to do. How well do different materials filter water?"
2. Show the class the 3 filter materials to be used. Demonstrate how the experiment will be set up as follows:
   a. Place one filter material over the opening of the cup drooping it loosely into the cup. Do this for each test material.
   b. Students will pour ⅓ of the dirty water into each cup and observe the filtering process and results.
3. Once the students have heard the directions of what to do, introduce the word, "hypothesis," and discuss. Note that a hypothesis has a reason for why the results are expected.
4. Students cut out the 3 materials from the bottom of the page and make a hypothesis by gluing the pictures onto the "I think" section of the activity sheet.
5. Students will test the filter materials by following the directions given above.
6. Students will observe the filtration and make their conclusions by cutting the remaining pictures out and gluing them onto the "I found" section of the activity sheet.
7. Discuss the results. Emphasize that this was an experiment because the class tested different materials to see if the results were affected by using them.

CLOSURE:

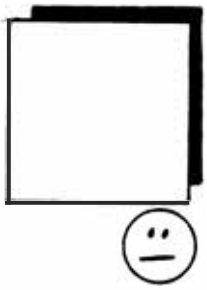
8. Hold up another container of dirty water and ask the class, "Which material should I pour this water through to get it the cleanest? Why?"
9. Answer H_2O's question and enter it into H_2O and the Student Droid Booklet.

FILTERING

Name _____

Max Cantu '91

I think



Testing

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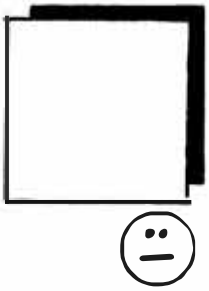
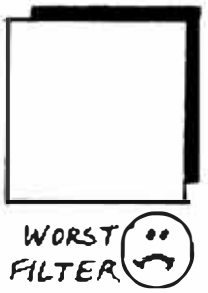
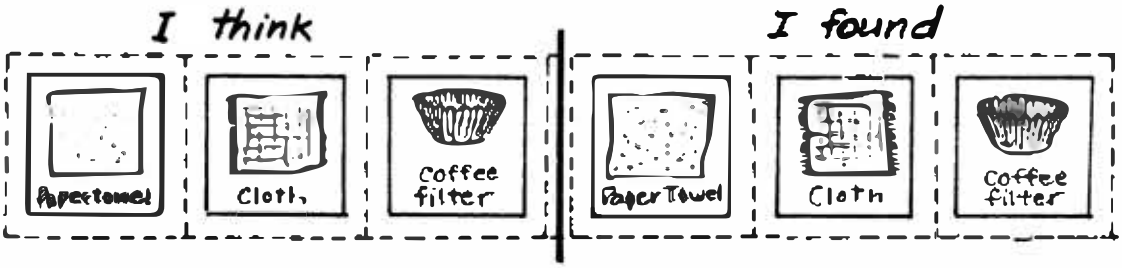






WATER IN SOIL, SAND, ROCK, AND GRASS

QUESTION: Is there water in soil, sand, rock, and grass?

OBJECTIVE: Students will observe the evaporation/condensation of water from various materials.

ACTIVITY: Students will perform an experiment testing whether water can be evaporated from various materials.

EXPECTED OUTCOME: All materials will have some degree of moisture depending upon their original moisture content.

CURRICULUM CONNECTION:
Science

THINKING PROCESSES:
Observing
Communicating

BACKGROUND NOTES: Water can exist in 3 states: solid, liquid, or gas. Evaporation is the phase change of a liquid to a gas. Evaporation of the water that an object holds will take place with an increase in temperature and over time. All living things contain some water.

BEFORE YOU START:

1. For a more open-ended discovery approach ask the students if they could design an experiment to see if there is water in soil, sand, rocks, or plant material.

MATERIALS:

per group
4 — 9 oz. cups
4 rubberbands to fit the mouth of the cup
4 pieces of plastic wrap to cover the mouth of the cup
¼ cup sand, soil, grass, and rocks

PROCEDURES:

1. **Droid Link:** "Let's do an experiment! Do you think that there is water in sand, soil, rock, or grass?"

2. Ask the question and distribute the activity sheet to the students.

3. Explain the procedure for the experiment as follows:
   a. Make a prediction for each item under the "I think" section.
   b. Place each item in a cup and trace the labels on the activity sheet.
   c. Cover each cup with plastic wrap, securing with a rubber band.
   d. Place in the hot sun or under a lamp.
   NOTE: At this point, review the process of evaporation as part of the water cycle.

4. Students record their predictions, prepare the experiment, and record the results in each cup on the activity sheet.

CLOSURE:

5. Students copy from the board or write their own conclusion for each item.

6. Answer the question and enter it into H_2O and the Student Droid Booklet.

Is there water in soil, sand, rock, and grass?

Name _____

Mak Carth '91

I think: YES/No

soil

I found out: YES/NO

I think: YES/NO

sand

I found out: YES/NO

I think: YES/NO

rocks

I found out: YES/NO

I think: YES/NO

grass

I found out: YES/NO

Let's do an experiment! Do you think there is water in soil, sand, rock, and grass?

Hi kids! Did you know that the Earth's solar system nickname is the "Water Planet." How much of the Earth is covered with water? Let me give you some information to help you answer this question. The Earth is mostly covered with water. If you could cut the Earth into 4 equal parts, 3 of them would be covered with water and only one would be land. The Earth is 3/4 covered with water.

WATER PLANET

QUESTION: How much of the earth is covered with water?

OBJECTIVE: Students will construct a model of the earth and will learn that the earth is mostly covered with water.

ACTIVITY: Using paper plates, students will construct a model of the earth showing that it is ¾ covered with water.

EXPECTED OUTCOME: Each student will have a completed model.

CURRICULUM CONNECTION:
Geography
language arts
Science
Mathematics

THINKING PROCESSES:
Observing
Communicating
Comparing

MATH STRANDS:
Numbers-fractions

BACKGROUND NOTES: The Earth is mainly a water planet. Approximately ¾ of its surface is covered by ocean. The ocean's average depth is 2 miles. The Earth would be a much different planet without the huge amount of water covering it. Without the oceans our planet's temperature, weather, and life forms would be significantly changed.

BEFORE YOU START:

1. This activity may be done at a center with adult supervision.
2. Secure string across the inside of one plate, north to south, with ends hanging out.
3. Pre-staple the paper plates together with the bulging sides facing out to simulate a sphere.
4. If you use tempera paint to color the plates, you should allow time for the plates to dry.

MATERIALS:

paper plates—2 per child
glue or paste
scissors
copies of land masses
blue tempra paint or crayon
paint brushes
yarn or string
tape

PROCEDURES:

1. **Droid Link:** Take the question strip from H_2O ... "Hi kids, did you know that the earth's nickname is "The Water Planet"? How much of the earth is covered with water?"
2. Tell the class that H_2O has given them a fact strip about the earth. Remove another strip from H_2O, this one reading, "The earth is mostly covered with water. If you could cut the earth into 4 equal parts, 3 of them would be water and only one would be land. The earth is ¾ covered with water."
3. Show the class a globe and discuss the information that H_2O has given you.
4. Tell the class that they are going to construct a model of our planet.
5. Build the model by:
   a. Coloring or painting the bottom of each of 2 plates blue. If paint is used, add a little white glue to the paint to prevent flaking. Sprinkle salt onto the wet paint to simulate the salty oceans.
   b. Staple the 2 plates together. The plates should bulge outward and be stapled near the edges. Use 3 or 4 staples per model.
   c. Color the land masses brown, then cut them out and glue them onto the sides of the plates (earth). Each of the two land masses should be cut out as whole units. (Make sure north/south direction coincides when putting plates together.)
   d. Optional — To add the polar regions, small cut outs of white paper can be used to represent the polar ice caps.

CLOSURE:

6. Choral read the limerick, "The Water Planet" (included).
7. Have the students attach their copy of the limerick to the bottom of their earth model as shown on the limerick page. Use string or yarn and tape.
8. Write the answer to the question on a paper strip, give to H_2O, and record in the Student Droid Booklet.

THE WATER PLANET

Look at a globe and what do you see?
There's a lot of water around you and me.
Isn't it grand
That we live on the land.
'Cause the earth is mostly sea.

THE WATER PLANET

Look at a globe and what do you see?
There's a lot of water around you and me.
Isn't it grand
That we live on the land.
'Cause the earth is mostly sea.

MAKE A MOBILE:

Hang two poem cards back-to-back on bottom end of string or yarn.

THE WATER PLANET

Look at a globe and what do you see?
There's a lot of water around you and me.
Isn't it grand
That we live on the land.
'Cause the earth is mostly sea.

THE WATER PLANET

Look at a globe and what do you see?
There's a lot of water around you and me.
Isn't it grand
That we live on the land.
'Cause the earth is mostly sea.

WATER ON THE EARTH

QUESTION: How much of the Earth's water is fresh water?

OBJECTIVE: Students will observe the small percentage of the Earth's water that is fresh.

ACTIVITY: The teacher will fill a 2 liter bottle to represent the percentage of the Earth's water that is salty (97%) and fresh (3%).

EXPECTED OUTCOME: A model that illustrates the percentages.

CURRICULUM CONNECTION:
Science
Art
Math

THINKING PROCESSES:
Observing
Communicating
Comparing

BACKGROUND NOTES: See the "The Water Planet" lesson.

BEFORE YOU START:

Teacher Demo:

1. The vegetable oil should be as dark yellow as possible (corn oil is the best).
2. Prior to the demo, put 3 drops of green food coloring into the empty 2 liter bottle to represent "salty water." Try to keep food color off the sides of the bottle.

Student Demo:

1. Add water to white glue to make it thin enough to "paint" on the "salt-water" part of the picture of the bottle. Use 1 part glue to 3 parts water — you may want to add a few drops of green food coloring to represent salt water.
2. Put salt into salt shakers to sprinkle onto the area painted with glue.

MATERIALS:

teacher demo:

1 2-liter clear soda bottle	green food coloring	yellow, corn oil (60 ml)
salt, coarse or rock	water (1,940 ml)	

per student:

activity sheet	watered-down glue mixture	several salt shakers for the class
blue crayon	paint brush	

PROCEDURES:

1. **Droid Link:** Take the question strip from H_2O ... "Water, water everywhere but how much can we really drink? How much of the Earth's water is fresh, usable water?"
2. The teacher demonstrates the amount of water on Earth by filling a 2-liter bottle with the same percentages of salty and fresh water as there is on Earth: 97% Salty and 3% Fresh water.
3. Pour nearly 2 liters of water (1,940 ml) into the 2 liter bottle (2000 ml). As the water hits the bottom of the bottle, the green food coloring (put in prior to class) turns the water green representing the ocean or salty water.
4. The teacher then adds 2-3 tsp. of salt to the green water explaining that this water represents the ocean water. This water is salty, and we cannot drink it or use it to water fresh water plants.
5. The teacher then shows the class a small, clear container with 60 ml corn oil representing 3% of the fresh water that is available on the Earth. Slowly pour the oil on top of the salt water in the 2 liter bottle explaining that it represents all the fresh water that is available for drinking, plant use, and all of our other fresh water needs.

CLOSURE:

6. Students will then make a representation of the demonstration by:
   a. painting the part of the bottle on the activity sheet that is labeled "salt water" with the thinned glue mixture.
   b. sprinkling the "salt water" glued area with salt. (see "Before You Start:")
   c. coloring the "fresh water layer" with blue crayon.
7. Write the answer to H_2O's question on a strip of paper and enter it into H_2O. Record the answer in the Student Droid Booklet.

   Example — Most of the water on Earth is salt water. There is very little fresh water on the Earth.

WATER on the EARTH

FRESH WATER

Max Canu '91

Salt Water

Name _____

Water, water everywhere but how much can we really drink? How much of the earth's water is fresh, usable water.

How is salt water different than fresh water? Boy, you'll want to know that before you take a drink!
So, what would happen if you watered your plants with salty water?

FRESH WATER — SALT WATER

QUESTION:
1. How is salt.water different than fresh water?
2. What would happen if you watered your plants with salty water?

OBJECTIVE: Students will observe and compare fresh and salt water.

ACTIVITY: Students will observe 2 samples of water, salt and fresh. They will use their senses of sight, smell, and taste. Students will use the samples to water plants and observe the effects.

EXPECTED OUTCOME:
1. Students will differentiate between salt and fresh water.
2. The plants receiving the salt water will not survive.

CURRICULUM CONNECTION:
Science

THINKING PROCESSES:
Observing
Comparing
Relating

BACKGROUND NOTES: There are two main types of water on earth: salt and fresh. Most of the water on earth is salt water. Salt water is 3.5% salt. The salts in the sea are mainly composed of table salt (sodium chloride). Sea water also contains magnesium, sulfur, calcium and smaller amounts of all of the elements contained in the earth's crust. The oceans become salty as run off from the land masses carries salts to the sea in rivers and streams. Over time these additional salts have made the oceans more salty.

BEFORE YOU START:
1. Students should work in small groups.
2. There are two question strips in this lesson. Be sure to take them out at the appropriate times.
3. Collect the activity sheets after the first day of the lesson and hold them until the students need them on days 5 and 10.

MATERIALS:
Part One:
2 liters of salt water — (70 grams of salt in 2 liters of water or approx. 8 tsp. salt in 2 liters of water.)
2 liters of fresh water
32 small clear cups (5 oz.) — 4 per group
Q-tips — 2 per child

Part Two:
per group:
200 bird or rye grass seeds
2 plastic cups
2 cups soil

PROCEDURES:
Part One:
1. **Droid Link:** Take the question strip from H_2O ... "How is salt water different than fresh water? Boy, you'll want to know that before you take a drink!" Ask the question. Record a few responses on the board.
2. Give each group a 5 oz. cup of both salt and fresh water.
3. Have them observe the samples using their senses of sight, smell, and taste.
   a. To visually observe the cups have the students look through the sides of the cups and write a descriptive word on their activity sheet about their clarity.
   b. For smell, have each child smell each of the 2 cups at least twice. They may want to close their eyes while doing these observations. Students can try to identify the salty water and the fresh water by using only their sense of smell. Students write a descriptive word for smell. If they do not smell a difference, then they should write "same smell" for each sample.
   c. For taste, each child uses 2 Q-tips to dip one into each sample and taste a small amount of each water. Students write a descriptive word for taste.
4. Have a discussion about the differences between salt and fresh water.

Part Two

1. **Droid Link:** Take the second question strip from H_2O ... "So, what would happen if you planted your plants in salty water?"

6. Experiment with the water samples by planting 100 rye grass seeds or bird seeds into each of 2 cups of soil. Water one of the cups with the fresh water and the other cup with the salt water sample. Be sure to label the cups. Note: Students should water the cups daily (2-3 tsp. of water per day). They should place the cups in a location that gets the same amount of light.

7. Ask students to hypothesize the outcome of the experiment.

8. After 5 days have the students observe the cups and draw in the results on the bottom of the student activity page.

9. After 10 days record the final observations on the final two cups on the activity page.

CLOSURE:

10. Discuss the results.

11. Answer the questions. Write the answers on a strip and insert into H_2O and record in Student Droid Booklet.

Observations

FRESH WATER

Day **5**

Day **10**

SALT WATER

Day **5**

Day **10**

NO SALTY RAIN

QUESTION: Why don't we have salty rain?

OBJECTIVE: Students will observe that during the evaporation process of salt water, the salt does not evaporate and is left behind.

ACTIVITY: The students will place salt water in a 9 oz. cup and observe that the water evaporates and leaves the salt behind in the cup.

EXPECTED OUTCOME: The salt crystals will remain in the cup making the remaining water more saline.

CURRICULUM CONNECTION:
Science

THINKING PROCESSES:
Observing
Relating
Comparing
Communicating
Applying

BACKGROUND NOTES: Review the background information on the water cycle from the previous cycle lessons. In this lesson, the students will observe that most of the salt is left in the bottom of the container. Some of the salt may appear on the sides of the container but not on the top or sides of the baggie or plastic wrap. The salt molecules reform their crystal structure in the bottom of the container. Evaporation is not a property of salt as it is with water.

BEFORE YOU START:

1. Use hot tap water that is safe to the touch. This will help to speed up the evaporation process.
2. The teacher should pour the hot tap water into the cups, etc. for the students.

MATERIALS:

per student
1 — 5 oz. cup (clear if possible)
½ tsp. salt
1 — ziplock sandwich baggie
approx. 50 ml of hot tap water (fill cup about 1 cm or ¼ inch)

PROCEDURES:

1. **Droid Link:** Take the question strip from H_2O ... "Howdy again, I'll bet you were wondering ... if most of the Earth's water is salty ocean water, why don't we have salty rain?"
2. Review with the students what happened during the activity, "Water Cycle in a Cup."
3. Ask the students if they have ever tasted RAIN — "Is it salty?" Discuss their responses.
4. Discuss that since ¾ of the earth is covered with salt water and that most of the water in clouds is evaporated from the oceans, why is it that the rain doesn't taste salty?
5. Discuss with the class they are going to set up an experiment to find out the answer as follows:
   a. Use the 5 oz. cup from "Water Cycle in a Cup" or any other cup that will fit into a sandwich or quart size ziplock baggie.
   b. Place approximately 50 ml or ¼" hot tap water into the cup.
   c. Have the students pour ½ tsp. of salt into the cup; stir.
   d. Allow students to taste the "salty water" so they will be able to verify (taste) the fact that the water is not salty after the evaporation.
   e. Place the cup into a ziplock baggie and place in the sun or under a heat lamp or 150 watt lamp. They may also be taped to the sunny side of a wall.
   f. Check baggies after condensation has taken place on the surface of the baggie.
   g. Allow the students to taste the water from the sides of the baggie by wiping their clean finger across the condensation inside the baggie. It should not be salty.

CLOSURE:

6. Discuss where the salt must be if the condensed water that they tasted is not salty.
7. Verify that the water in the cup is still salty by tasting it.
8. Discuss the fact that salt does not evaporate, only the water.
9. The class determines the answer to H_2O's question and records it on a paper strip that will go into H_2O. Students should record their answer in their Student Droid Booklet.

Howdy again, I'll bet you were wondering if most of the earth's water is salty ocean water, why don't we have salty rain?

NO SALTY RAIN

Do you like to act? Well, let's answer this question with a play. What happens to the salt when salty water evaporates?

SALT WATER EVAPORATION

SALT WATER EVAPORATION

QUESTION: What happens to the salt when salt water evaporates?

OBJECTIVE: Students will observe the way that water evaporates from salt water.

ACTIVITY: Students will set out a shallow pan of salt water to watch the evaporation take place. They will also hear the story of how water evaporates from salt water. They will then sequence the story and act it out.

EXPECTED OUTCOME: There will be a formation of salt crystals in the pan.

CURRICULUM CONNECTION:
Language arts
Science
Fine Arts—dramatic play

THINKING PROCESSES:
Observing
Communicating
Ordering

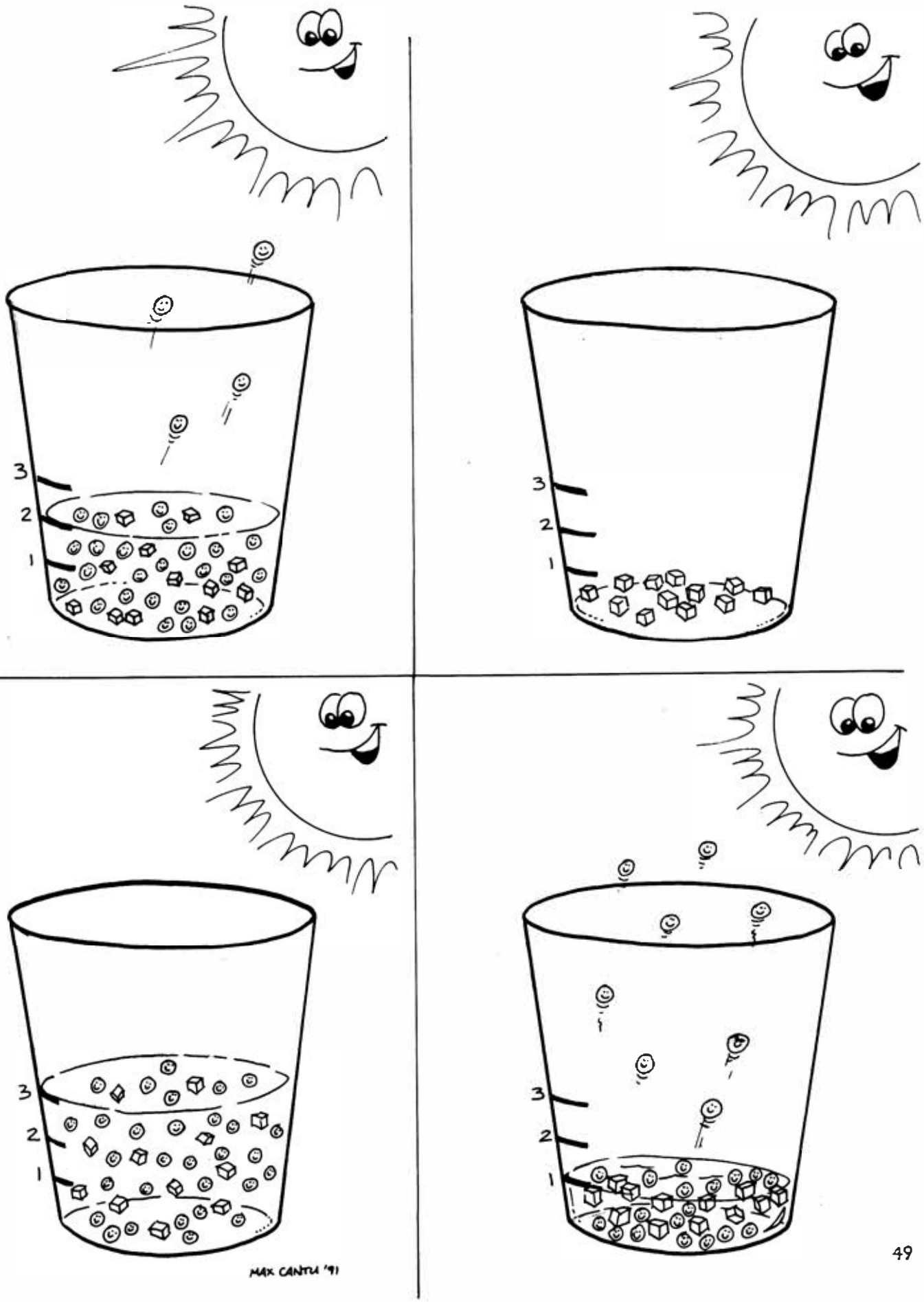
BACKGROUND NOTES: When salt dissolves in water, it undergoes physical and chemical changes. Salt (sodium chloride) molecules break down into smaller units. When salt dissolves, the sodium chloride molecules (NaCl) disassociate from one another and become sodium (Na+) and chlorine (Cl-) ions. Water molecules then surround these ions. When the water evaporates, the sodium and chlorine ions reunite to form salt crystals. The water molecules (H_2O) are less massive than the salt molecules (NaCl) and are more easily buoyed up into the air and evaporate. The majority of the sodium and chloride atoms remain in the container and reform into cubic salt crystals.

BEFORE YOU START:
1. Have the sequence cards pre-made.
2. Have play label tags cut out.
3. Have a piece of yarn cut long enough for 12 students to get within its circumference.

MATERIALS:
sequence paper— one to use as a flannel story and one per student
play name tags
shallow metal pan
paper strip
a hot plate
yarn
water (⅓ cup)
tape
salt (1 heaping tsp.)

PROCEDURES:
1. **Droid Link:** Take the question strip from H_2O ... "Do you like to act? Well, let's answer this question with a play. What happens to the salt when salt water evaporates?"
2. Cut out one set of the sequence cards to use in a flannel board type story.
3. Teacher says, "H_2O has given us our next question. Let's set a pan of salt water on the hot plate to see what happens. While we are waiting, I will tell you how salt water evaporates.
4. Teacher tells the story using the sequence cards. "One bright, sunny day, there was a cup half full of salt water. The solution had molecules of salt and molecules of water in the cup." Show the sequence card with the cup filled to level 3 with salt water.
5. "Then some of the molecules of water evaporated into the air— 'Good bye,' they said as they left the solution. 'We are off to join the water cycle.'" Show the sequence card with level 2 of salt water.
6. "Well, as more and more water molecules left the solution of salt water, the salt molecules were getting lonely being left behind. They asked, 'Please let us go with you.' But the water molecules said, 'Oh, we are so sorry but evaporating is something that water molecules can do but salt molecules have a hard time doing.'" Show sequence card with level 1 of salt water.
7. "Soon all of the water molecules evaporated into the air and most of the salt stayed in the cup." Show final card.

CLOSURE:
8. Students will cut out, color in, and sequence the 4 cards in the correct order. As an oral language activity, students can retell the story using their sequence cards.
9. Observe the salt crystals remaining in the pan. Discuss.
10. Students will act out the story of evaporation by 8 students wearing the WATER name tag and 4 students wearing the SALT name tag. All 12 students sit inside a yarn circle. They recite the dialogue used by the teacher as she told the story (or teacher can retell the story). Water molecules will stand up and jump out as they evaporate out of the "cup" (circle), leaving all the salt molecules behind. (To facilitate orderly evaporation of water molecules have students assigned to three groups of water molecules.)
11. The class will answer the question and enter it into H_2O and their Student Droid Booklet.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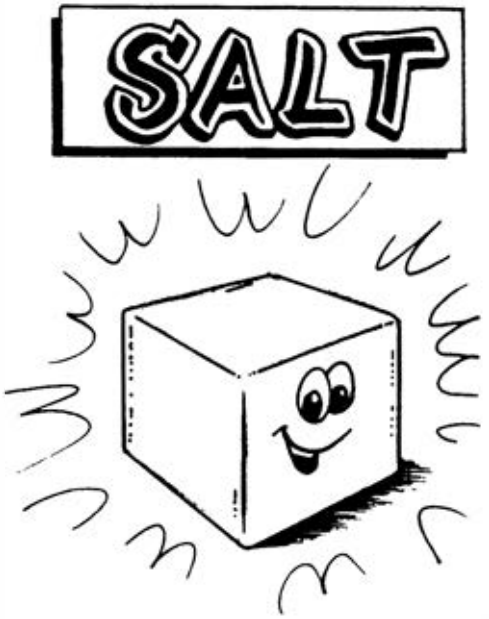
MAX CANTU '91

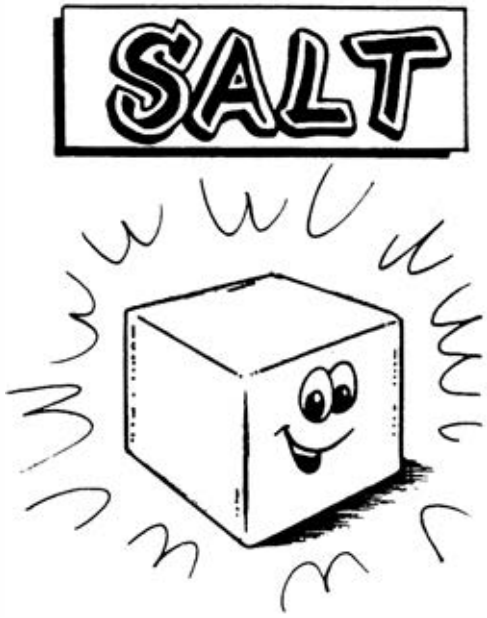

WATER


WATER
Max Cantu '91


WATER


WATER


SALT


SALT

DROUGHT

QUESTION: What is a drought?

OBJECTIVE: The students will define the word drought by observing the growth of plants under drought and non-drought conditions.

ACTIVITY: Students will grow grass seed with varying amounts of water.

EXPECTED OUTCOME: The seeds watered with the drought amount of water should not thrive.

CURRICULUM CONNECTION:
Science
Math
Language arts

THINKING PROCESSES:
Observing
Communicating
Comparing

MATH STRANDS:
Measuring

BACKGROUND NOTES: One definition of a drought is a prolonged period of little or no rainfall.

BEFORE YOU START:

Part One:

1. Cut out background scene and class set of raindrops.

Part Two:

1. The teacher should tape the measuring cup cutouts onto the 9 or 10 oz. cups. Each team will need a #1 Drought cup and #2 Normal Rainfall cup. Note: Measuring tapes for both 9 and 10 oz. cups are provided. The drought cup has 20 ml of water. The normal cup has 80 ml of water.

2. Instead of using rye grass seed, wild bird seed mix works well. It is available at markets, year round.

MATERIALS:

Part One:

9 oz. plastic cup with a background scene taped on (found on the water drops page)
class set of cut out raindrops
activity sheet, "Drought-Normal rainfall"
blue crayons

Part Two: per group

4 — 9 oz. clear plastic cups
1/2 cup gravel
1/2 cup soil
rye grass seed (200 seeds)
1/2 cup sand (optional)
activity sheets

PROCEDURES:

Part One:

1. **Droid Link:** Take the question strip from H_2O ... "What is a drought? I'll give you a hint ... droughts are not another kind of droid!"

2. "Let's pretend that each of you has collected some rain water." The teacher hands out a cut out water drop to each student. They fold each raindrop to add volume to the cup.

3. "In a drought year, there is very little rain and not a lot of water available for us to use." The class will count by 10's and only every tenth student will put their water drop into a cup that the teacher holds. (This should result in 2 or 3.)

4. The teacher passes back the water drops.

5. "On a normal, rainy year, lots of water is here for us to use." Each student puts their water drop into the teacher's cup.

6. Discuss the difference.

CLOSURE:

7. As a follow up, students will cut out the raindrops at the bottom of their activity page. They glue only 2 drops under the drought cloud and color in what the water level would look like (a very thin blue line at the bottom of the rocks).

8. They then cut out the rest of the raindrops and glue them under the normal rainfall cloud. They color in what the water level would look like (a thicker blue line at the rocks).

Part Two:

1. "Let's see the results of a drought on plants." Each team will grow grass with a normal amount of rainfall and with very little water as in a drought year. (Show the measuring cups that will be used.)

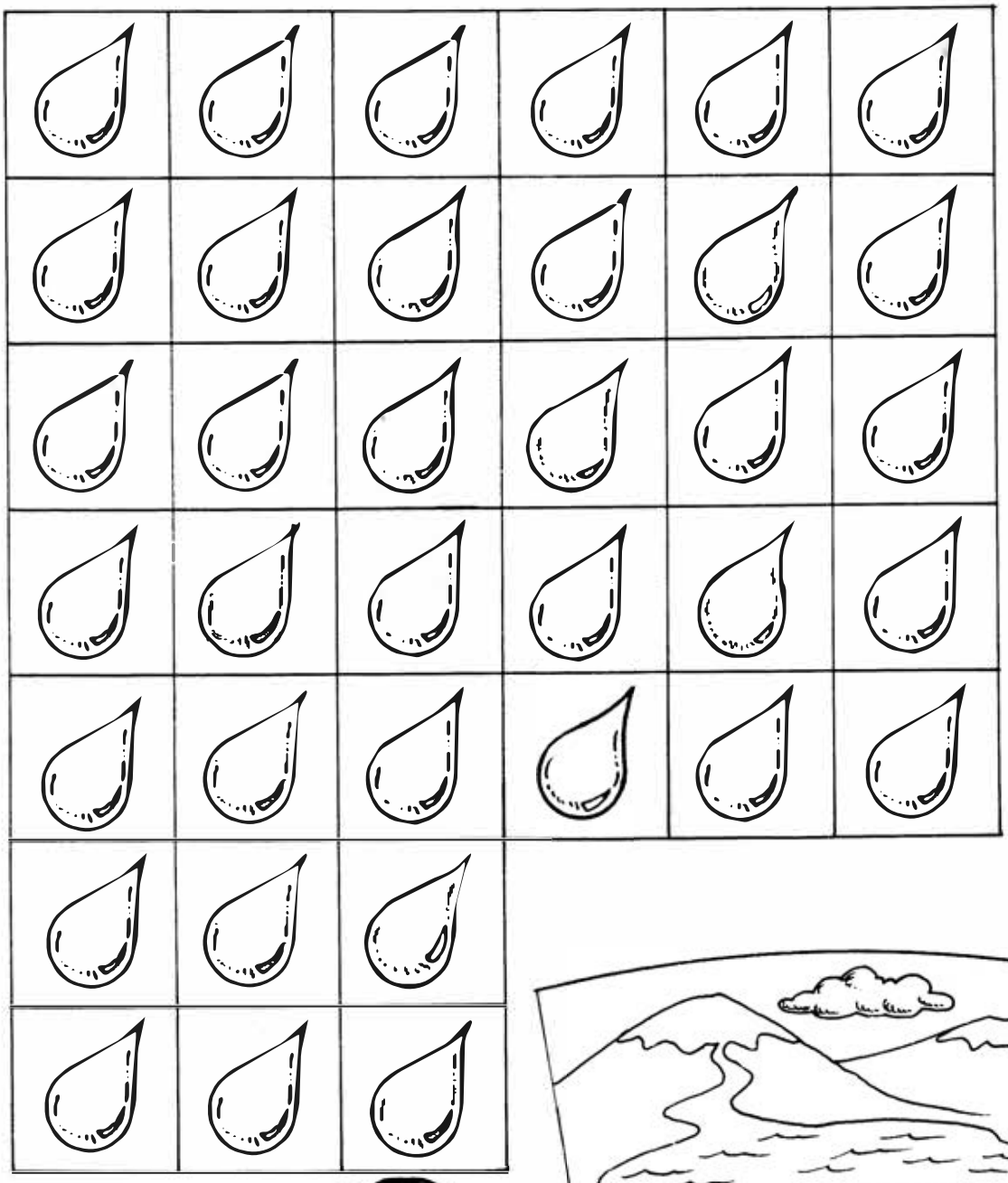
2. Set up the experiment as follows:
   a. Set up two growing cups with layers of ¼ cup gravel, sand, and soil each. One cup labeled #1 and the other #2.
   b. Count out 100 seeds for each cup. (Each student can count 25 and combine them.)
   c. Place the seeds in the cups on top of the soil. You may cover the seeds with ¼" of soil.
   d. Pour water into each measuring cup to the designated line (drought 20 ml and rainfall 60 ml) This is the only watering.
   e. Pour the water into the growing cup according to the labels. The cups will be watered only once at the beginning of the activity.
   f. Record on the activity sheet filling in the blanks for the number of seeds and the amount of watering. Also draw on the "now" space on the activity sheet what the cups look like as the experiment begins. Note the water level.
   g. In one week, record observations.

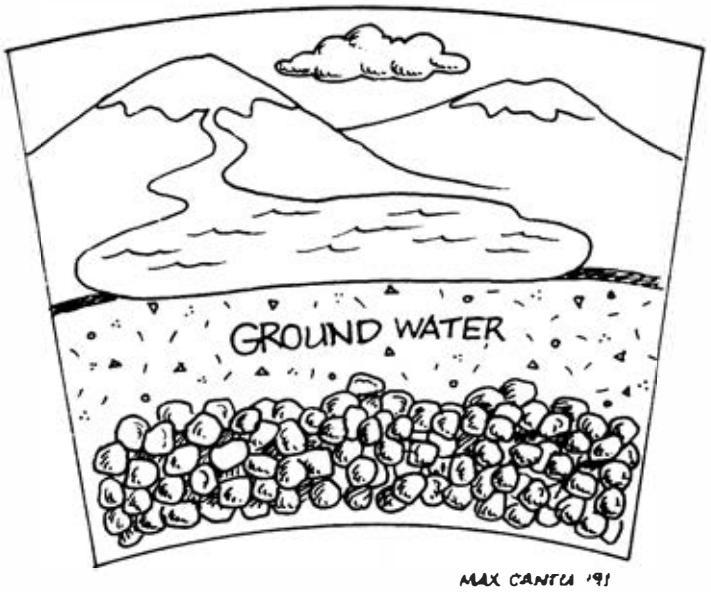
CLOSURE:

   h. In two weeks record the observations and fill in the conclusion.

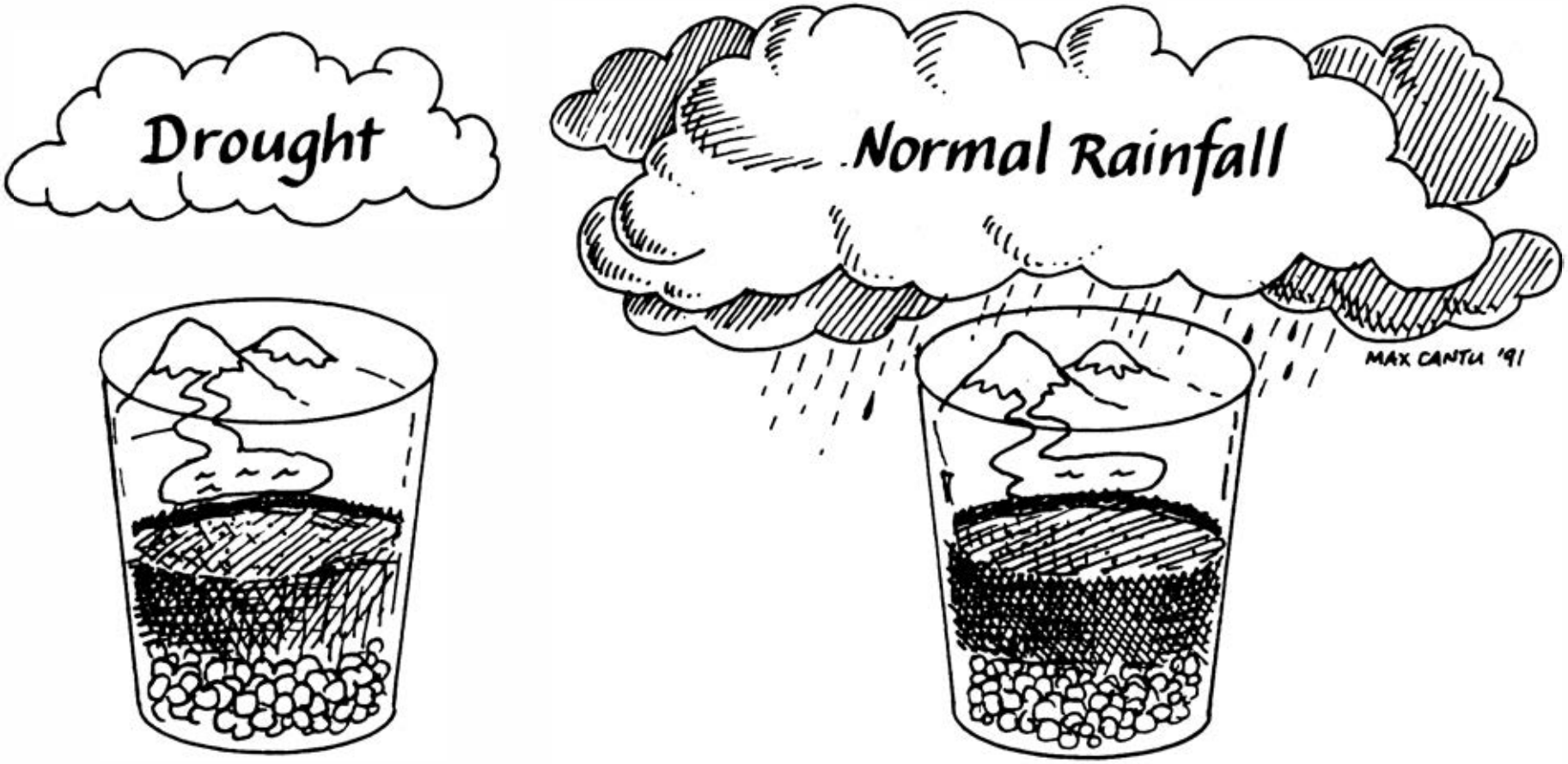
3. Discuss the effects of the drought.

4. Record the answer on an answer strip and enter into H_2O and the Student Droid Booklet.




GROUND WATER
MAX CANTU '91

Name _____



Name _____

DROUGHT GROWING CUP

We planted ____ seeds

NORMAL RAINFALL GROWING CUP

We planted ____ seeds

TODAY

ONE WEEK

TWO WEEKS

_____ ml water

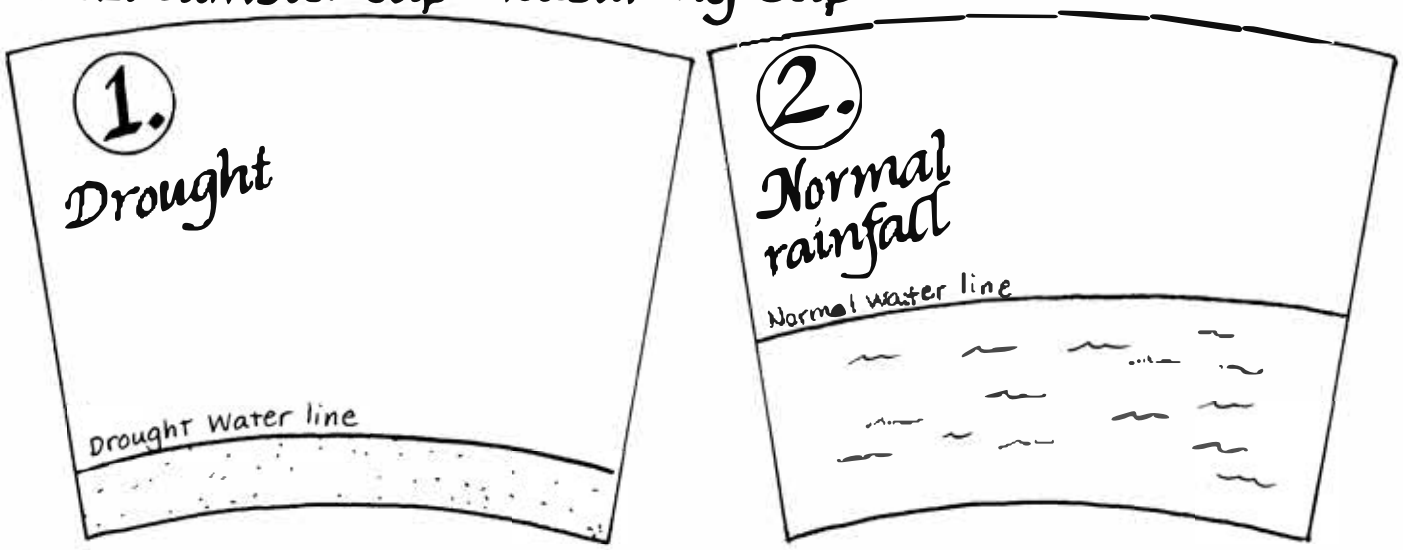
(is/is not) enough water to keep the grass growing.

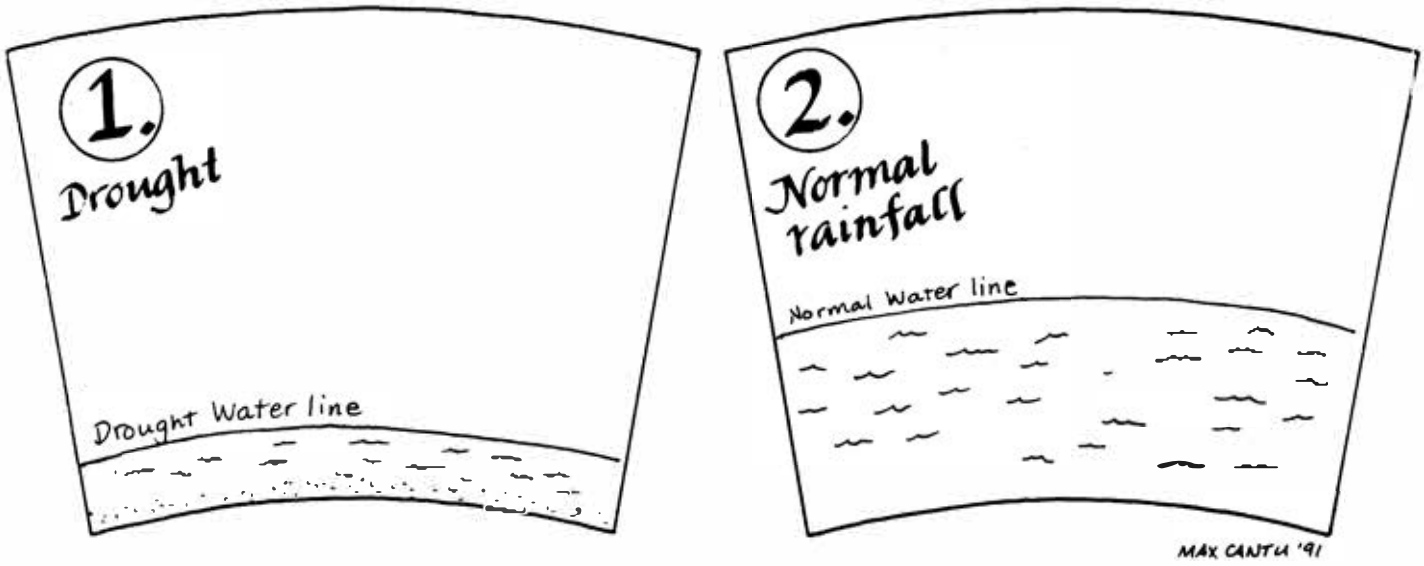
_____ ml water

(is/is not) enough water to keep the grass growing.

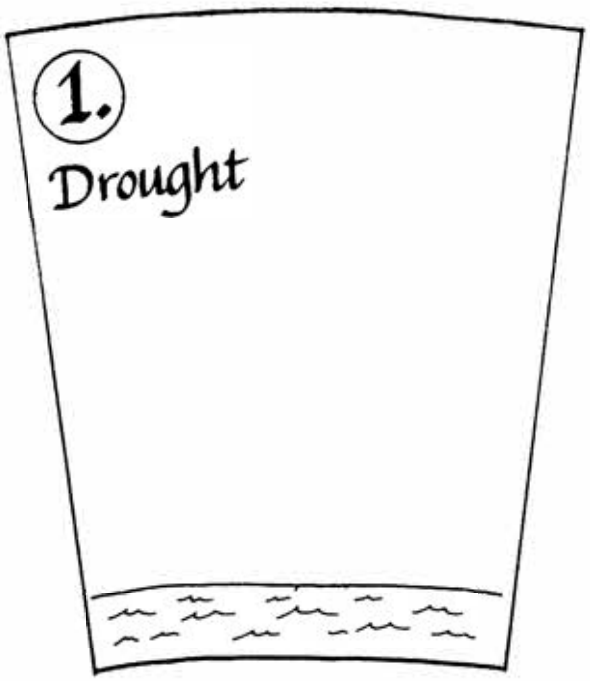
Measuring Cup Cut-outs for the Drought lesson.

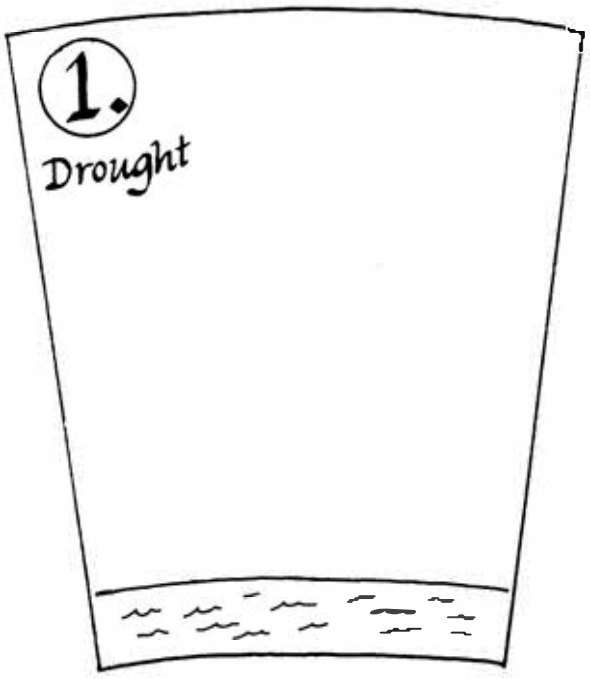
9 oz. tumbler cup Measuring Cup





10 oz. Measuring Cup





MAX CANTU '91

What is a drought? And I'll give you a hint — droughts are not another kind of droid!

DROUGHT

How do you use water? I don't! It rusts my circuits.

USING WATER

USING WATER

QUESTION: How do you use water?

OBJECTIVE: Students will identify the uses of water.

ACTIVITY: Student will make a book to show how they use water.

EXPECTED OUTCOME: The students will be able to use the completed book to share the uses of water.

CURRICULUM CONNECTION:
Science
Art
Language arts

THINKING PROCESSES:
Communicating

BACKGROUND NOTES: Water is the basis for all life. Humans can live for more than two months without food but can die in a week or less without water. All animals require water. Plants use large amounts of water through photosynthesis and through capillary action to feed their cells. Approximately 85% of the water used in California is for agricultural purposes with about 14% for urban use and 1% for recreation and wildlife use. Of the 14% used for urban areas, 65% is residential, 14% industrial, 13% commercial, and 8% for governmental uses. Over half of the water that is used by the average household is used outside in the yard for landscaping and other uses. It is important that we begin to recognize ways that everyone can save water.

BEFORE YOU START:

1. Get a photograph of each student, approximately 2" x 2", or have the students draw a picture of themselves on a 2" x 2" piece of construction paper. This picture will be attached to a piece of yarn or string and placed on top of the square on each page where it says "Put your picture here" throughout the booklet.

2. Optional: a 2½" square piece of paper can be attached to the front page of the booklet to make a little "pocket" to hold the photo or picture of the student.

3. If the students cannot write their own statements, the teacher can put in the words before copying. Student can then trace the words.

MATERIALS:

per student
activity pages for the booklet
2" square of tagboard or construction paper
optional student photo (could be photocopy of school photo)
10" piece of yarn

PROCEDURES:

1. **Droid Link:** Take the question strip from H_2O ... "How do you use water? I don't! It rusts my circuits!"

2. Take all suggestions from the students on how they use water. Record them on the board or on a chart. Guide the students though the different uses of water in the home, for industry, agriculture, and recreational uses.

3. Students will make the book included in this lesson about how they use water.

4. To make the book:
   a. Fold the 3 pages along the fold lines (folding in fourths).
   b. Stack the three mini books on top of each other, with the title page mini book on the top and the mini book, "Use water ..." last.
   c. Staple on the staple lines.
   d. Glue the student picture onto the 2" square.
   e. Tape or staple the picture square to one end of the yarn and attach the other end to the booklet by stapling it at the top left corner.

5. Students will color the pages of the booklet and write/copy/trace what they are doing in each picture.

6. The illustrations depict the following:
   p. 1 Cover
   p. 2-3 Using water for drinking
   p. 4-5 Using water for bathing
   p. 6-7 Using water for recreation: swimming, fishing, boating
   p. 8-9 Using water for agriculture
   p. 10-11 Using water to clean your car
   p. 12 Student responses

CLOSURE:

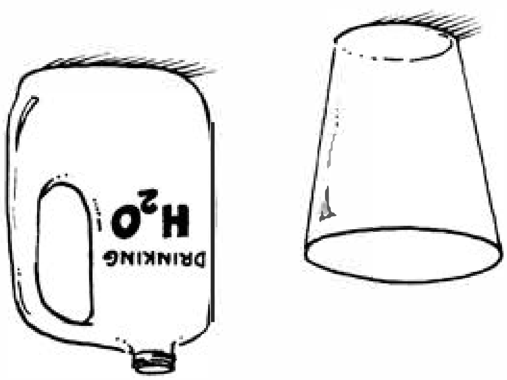
7. As a class, read each page while the students place their photo or picture square in the appropriate spot marked on each page.

8. Fill in the last page: "I am glad there is water because..."

9. Complete the answer strip for H_2O and record it in the Student Droid Booklet.

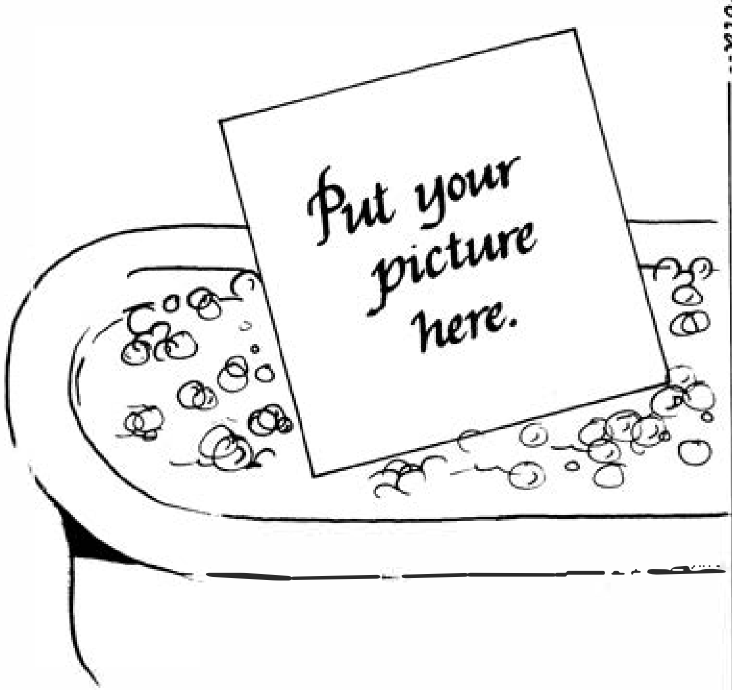
3

2



fold

fold



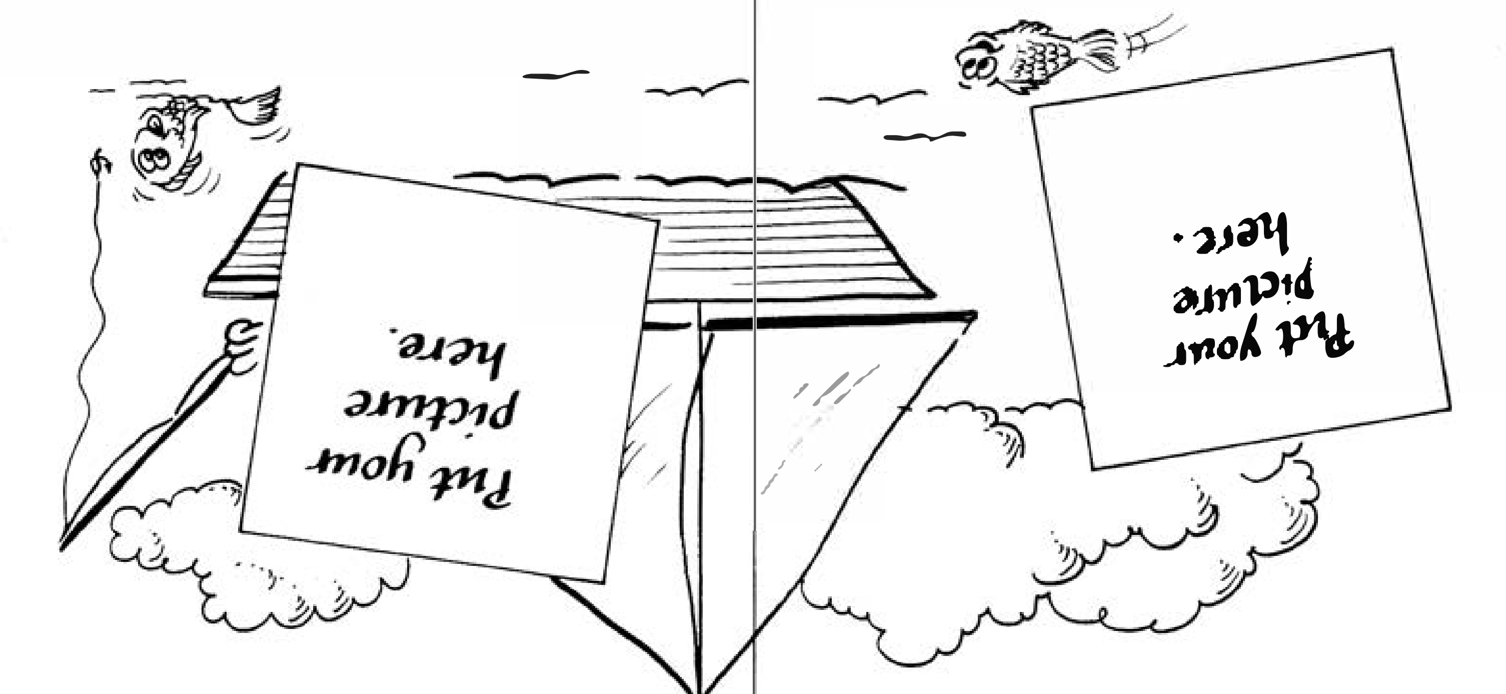
How I Use Water

by

4

7

6



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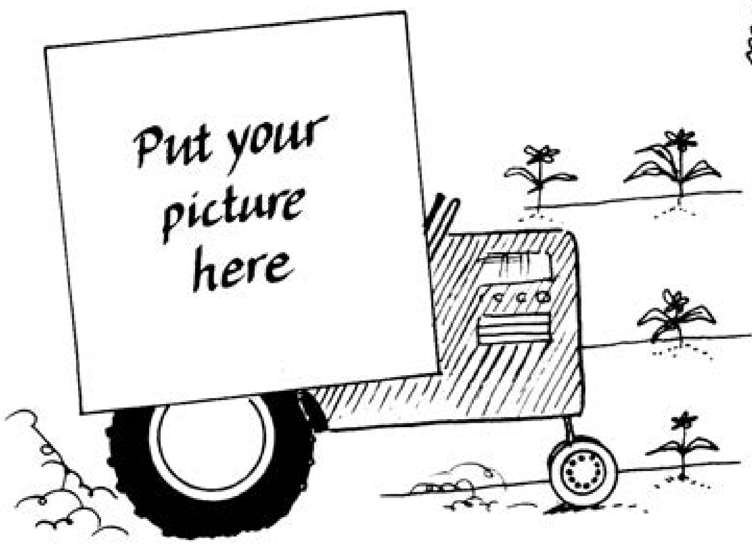

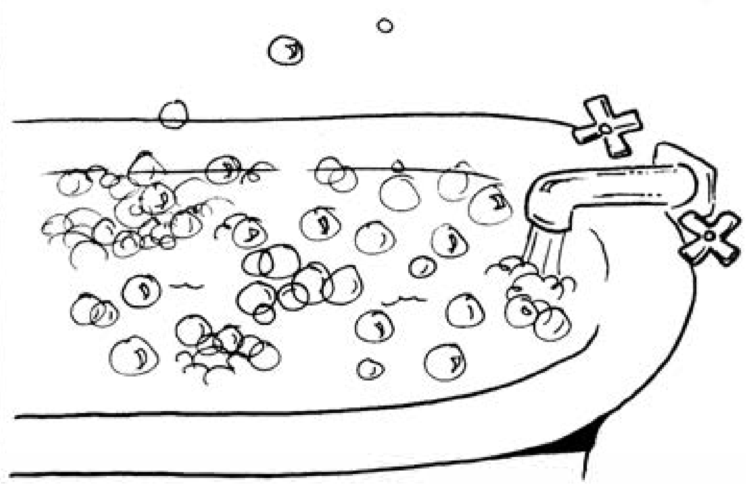

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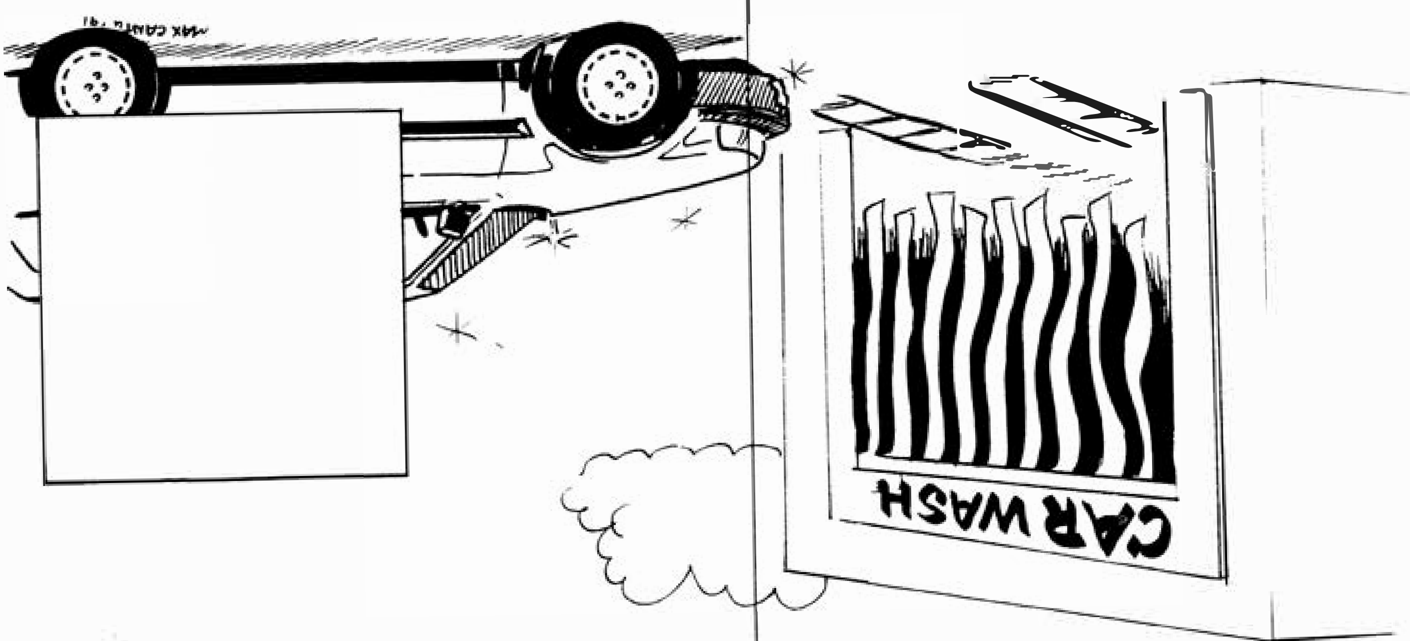


I'm glad there is water because

12

use water...

9

PLANTS IN POLLUTED WATER

QUESTION: What will happen to water plants in different types of polluted water?

OBJECTIVE: Students will observe the effects of different qualities of water on the growth of a water plant.

ACTIVITY: Each group of students will place a water plant (Elodea/Anacharis) in various types of polluted water and observe any change over time.

EXPECTED OUTCOME: **The plants growing in polluted water will deteriorate.**

CURRICULUM CONNECTION:
Science
Language arts

THINKING PROCESSES:
Observing
Comparing
Relating
Communicating

BACKGROUND NOTES: Begin the lesson with a discussion on what plants need to live. One of the most important things that the students should mention is the quality of the water that the plants receive. In this activity, we are using the Elodea or Anacharis plants that are used in an aquarium. They resemble a leafy rope with new growth leaves at one end of the plant. As the plant dies, it turns yellowish and begins to fall apart and rot. A lettuce leaf may be substituted for the aquarium plants.

BEFORE YOU START:

1. The teacher may want to mix the polluted water in front of the class so they may see how the solutions are made.
2. Most Elodea/Anacharis plants are sold in bundles of 6 to 8 plants that are about 7" or 8" long and available at any pet store that sells fish.
3. CAUTION: Do not use chlorine products, bleach, etc. It is possible for a chlorine product to be mixed with other products that could result in a chemical reaction releasing small amounts of chlorine gas.

MATERIALS:

per class
8 — 2 liter clear, plastic soda bottles, ¾ filled with water
8 — Elodea/Anacharis plants
8 — pollutants such as liquid soap, suntan oil, cooking oil, bacon grease, furniture polish, coffee, coke, shampoo, etc.

Teacher Demonstration
1 — 2-liter bottle that is ¾ filled with clear, clean water (It will be used for the "control" plant.)

PROCEDURES:

1. **Droid Link:** Take the question strip from H_2O ... "Hi kids! Today is YUCKY WATER DAY! Our experiment for today is 'What will happen to water plants in different types of polluted water?'"
2. Discuss the variables that plants need to grow.
3. Discuss the importance of the quality of water needed to grow plants.
4. Ask the question, "What will happen to plants if the water is polluted?"
5. Introduce and discuss the word, "polluted." Discuss how people's carelessness can affect the environment (quality of water).
6. Discuss the different types of water that will be used. Mix the water samples in front of students (see materials).
7. Prepare a demonstration container with one plant in fresh water. It will serve as the "control" plant.
8. Distribute the plants, a container, and a different type of polluted water to each group. Be sure to label each container with the type of polluted water used. Place the plants in the water.
9. Distribute observation sheets (or make a large class poster of the ditto). Have the students label each picture with the type of pollutant used in each container. Have students hypothesize by circling the plant containers that they think will live.
10. Explain to the students that they will be observing the plants in the water over the next two weeks and they will record the results for each container.

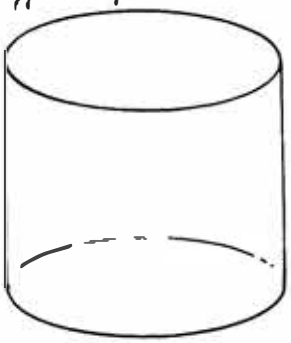
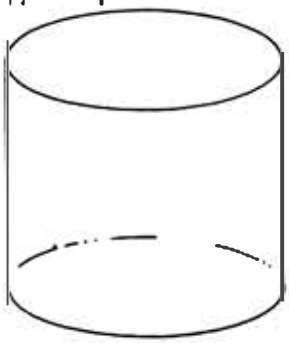
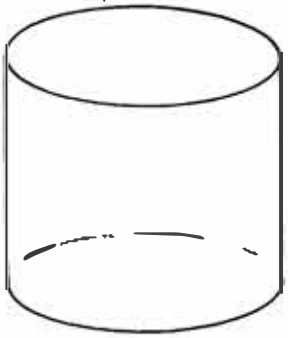
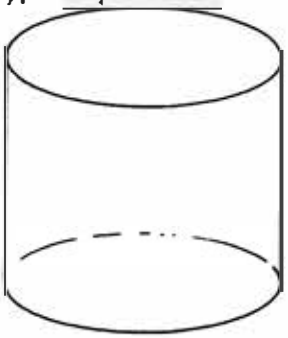
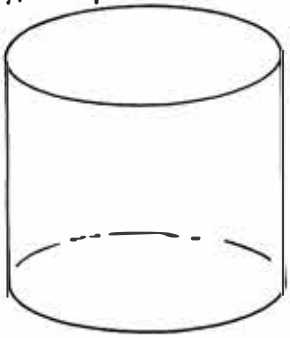
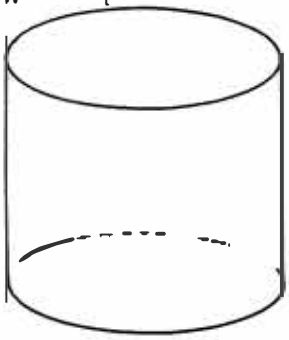
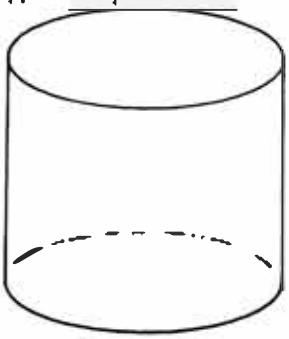
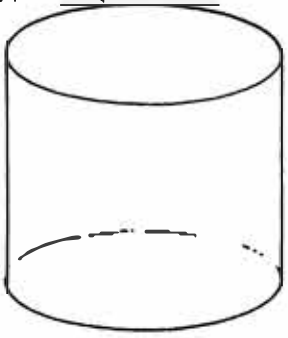
CLOSURE:

11. Conclude the experiment after about two weeks and draw pictures of the condition of all of the plants in the containers. Label each picture. Older students may write several sentences on "What Happened" on the back of their papers.
12. Record and enter the answer strip into H_2O and have the students record it in their Student Droid Booklet.

NAME _____

What will happen to water plants in different types of water?

MAX CANTU '91

FRESH WATER 	Type of polluted water 	Type of polluted water 
Type of polluted water 	Type of polluted water 	Type of polluted water 
Type of polluted water 	Type of polluted water 	Type of polluted water 

PLANTS IN POLLUTED WATER

Hi Kids! Today is Yucky Water Day! Our experiment for today is: What will happen to water plants in different types of polluted water?

GROUND WATER POLLUTION

Now we're talking about a deep, down, and yucky problem. How can ground water become polluted?

GROUND WATER POLLUTION

QUESTION: How can ground water become polluted?

OBJECTIVE: Students will observe how surface pollution can pollute the ground water.

ACTIVITY: Students will make a model that illustrates how ground water can become polluted.

EXPECTED OUTCOME: The ground water in the model will become polluted with red food coloring.

CURRICULUM CONNECTION:
Science

THINKING PROCESSES:
Observing
Comparing
Relating

BACKGROUND NOTES: When pollutants are introduced to the soil they can percolate down until they reach the ground water. Polluted ground water can move laterally until it reaches nearby wells. Pollutants could be solvents, solid waste, oil, paint, etc.

BEFORE YOU START:

1. This lesson should follow "Ground Water" and "Filtering Water Through the Earth."
2. Use the filter cups used in "Filtering Water Through the Earth."

MATERIALS:

Per group:
1 cup with 10 holes poked in the bottom of it with a push pin
1 — 9 oz filter cup (with sand and gravel) and the 10 oz. accumulation cup from the "Filtering Water Through the Earth" lesson

Per class:
red food coloring
ground water demonstration jar or 2 liter bottle from "Ground Water" lesson

PROCEDURES:

1. **Droid Link:** Take the question strip from H_2O ..."Now we're talking about a deep, down and yucky problem. How can ground water become polluted?"
2. Student lesson will use the same set-up as in "Filtering Water Through the Earth." A 9 oz. filter cup is placed over the 10 oz. clear plastic accumulation cup.
3. For rain #1, students will allow ¼ cup of clean tap water (placed in the cup with 10 pin holes in the bottom) to rain onto the filter cup. Students then observe the water in the 10 oz. cup and record their observations on the results cup on the activity sheet. They write a sentence describing the water in the 10 oz. cup.
4. For rain #2, place 3-4 drops of red food coloring on the top layer of material (rock or sand) in the filter cup. Allow ¼ cup of water to "rain" on the filter cup. Have students observe the "ground water" in the 10 oz. cup and record their observations on the results cup and write a sentence describing the water.

CLOSURE:

5. Discuss that the ground pollution (food color) travelled downward through the soil and ended up in the ground water (10 oz. cup).
6. Get out the 2 liter bottle or jar from the previous lesson "Ground Water." Review the names of the layers. Place 5-6 drops of food coloring on top of the soil layer. Ask the class: "What will happen if a cup of water rains down on this soil?" Have the students color in their predictions on the bottle found on the right side of the student page.
7. Allow a cup of "rain" to fall onto the soil and have students observe the result. Have them compare their predictions to the actual result.
8. Answer the question on the answer strip and enter into H_2O and the Student Droid Booklet.

MY FILTER

RESULTS 1

RAIN

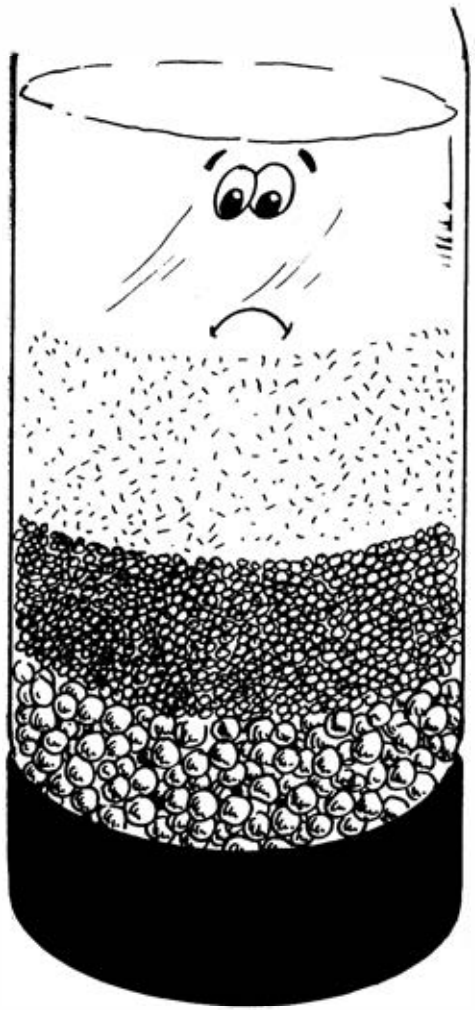
MY FILTER

RESULTS 2

RAIN

Name _____

POLLUTION!!!



MEETING WALLY WASTER AND INSPECTOR SAVER

QUESTION: What are some ways we waste water?

OBJECTIVE: Students will create a play to demonstrate their understanding of how to save water.

ACTIVITY: Students will make puppets of the two characters. These puppets will be held up to answer the teacher's questions about who would use water in a given manner, Wally or the Inspector? The students may also cut out the "puppet stage" and make up their own water saving conversations between the two puppets.

EXPECTED OUTCOME: A play will be completed by students.

CURRICULUM CONNECTION:
Language arts (oral language)

THINKING PROCESSES:
Communicating
Relating
Applying

BACKGROUND NOTES: Much of the water used inside and outside of the home is wasted. Over half of the water used in an individual home is used for landscaping purposes. Some of the ways that water can be conserved in the home and at school are:

1. Change to low flow shower heads.
2. Limit the time and temperature of the showers (remember to conserve heat energy too).
3. Partially fill the bathtub.
4. Don't use the toilet as an ashtray or trash can.
5. Turn off the water as teeth are being brushed.
6. Do not hose off driveways, etc.; use a broom.
7. Don't overwater lawns and plants.
8. Repair leaky faucets, sprinklers and toilets.
9. Rinse fruits and vegetables in a bowl of water; don't let the water run while rinsing.
10. Run the dishwasher and washer with full loads only.

NOTE: The above topics can be used for "play or conversation starters" for the students to make up plays or conversations between Wally and Inspector Saver.

BEFORE YOU START:
1. Run off the activity page on construction paper if possible.
2. Glue or tape puppets onto tongue depressors, ice cream sticks or pencils.
3. If you do not have a sink in your classroom, omit the reference in the "bridge statement" by H_2O on the sentence strip to the leaky faucet in the classroom. Just refer to a leaky faucet in general.

MATERIALS:
per student
1 activity page
2 tongue depressors, sticks, etc.
tape/glue
scissors
crayons

PROCEDURES:

1. **Droid Link:** Take question strip from H_2O which says: "Hello class, I would like to tell you about two people you should know, Wally Waster and Inspector Saver. Here are their pictures, so you can be on the look out for them...in fact, one of them may have been in your classroom already. Look around, do you see any water being wasted?" Students should notice a dripping faucet in the classroom that the teacher has started before this lesson began (*Be sure to put a bowl in the sink to catch any of the dripping water. At the end of the lesson, pour the water onto a plant in the classroom or outside. As soon as they discover the leaky faucet, TURN IT OFF!)

2. Brainstorm ways that water is wasted in the home. Record them on the board. (see background)

3. Brainstorm ways to correct "wasting habits" mentioned by the students.

4. Refer to Inspector Saver whose job is to help people think of ways to save water. Discuss how the students can save water.

5. Distribute activity page. (K-1) students get large puppets. (2-3) students get ditto with puppet stage.

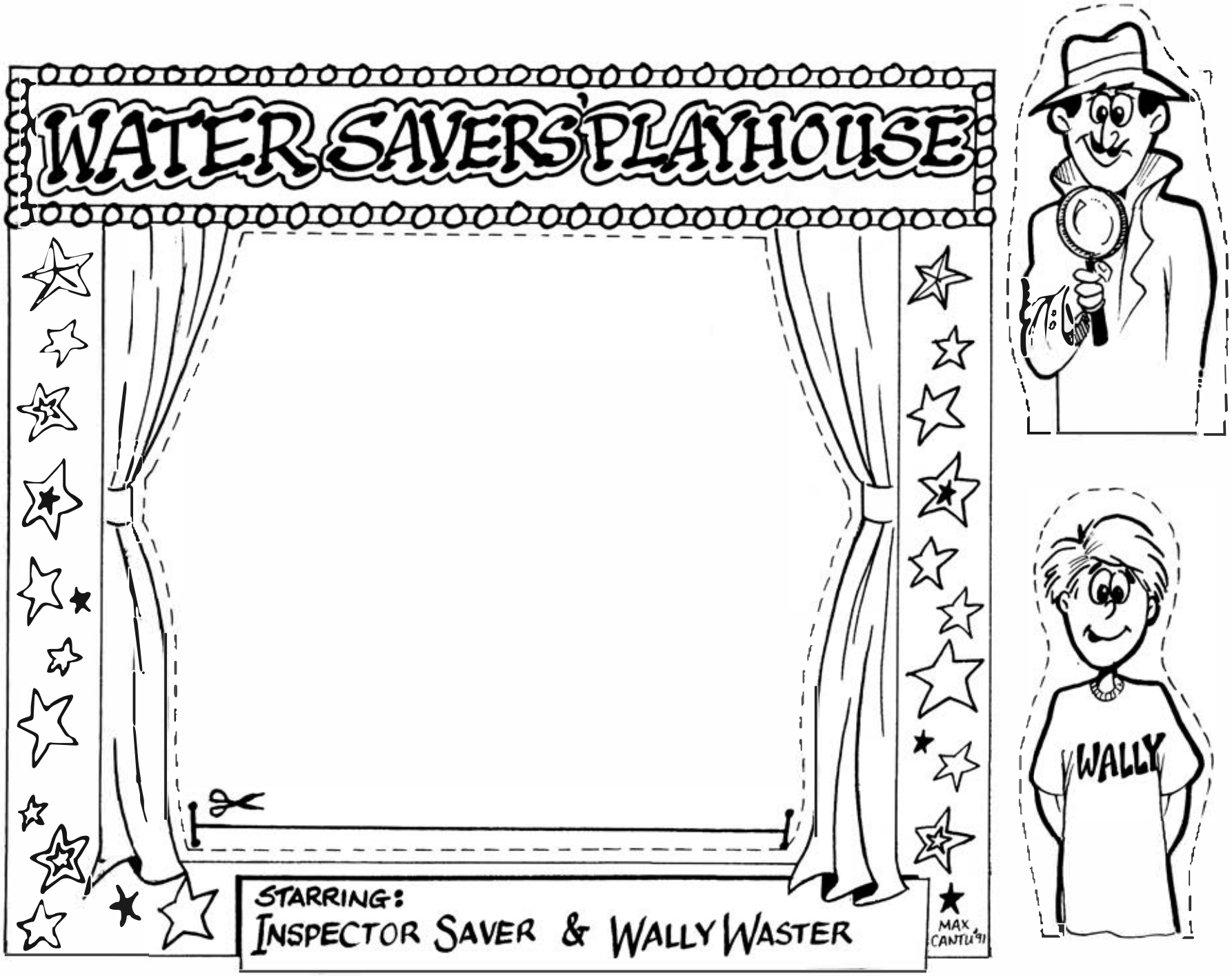
6. Have the students cut out the stage area along the dotted lines.

7. Tape it to the edge of their desks so that it hangs down over the side of their desks.

8. Have students sit on the floor or under their desks and hold the puppets up behind the stage and make up conversations or a little "play" on how to save water, etc. See the list of ways to save water that were given in the "Background Notes" or "STORY STARTERS" OR "IDEAS" TO MAKE UP CONVERSATION.

CLOSURE:

9. Students may share their "plays" with other groups or with the whole class.


WATER SAVERS' PLAYHOUSE
STARRING:
INSPECTOR SAVER & WALLY WASTER
MAX CANTU '91
WALLY

Puppet Characters

"Inspector Saver"

"Wally Waster"

Hello class, I would like to tell you about two people you should know, Wally Waster and Inspector Saver. Here are their pictures, so you can be on the look out for them — in fact, one of them may have been in your classroom already. Look around, do you see any water being wasted?

Are there any drips in this room? I mean the kind that are from a leaky faucet! How much water do we waste when a faucet is dripping?

DRIPS

QUESTION: How much water is wasted when a faucet is dripping?

OBJECTIVE: Students will observe how much water is wasted by a dripping faucet in 10 minutes.

ACTIVITY: Students will collect water from a dripping faucet and observe the amount of water wasted.

EXPECTED OUTCOME: A large volume of water is wasted in 10 minutes.

CURRICULUM CONNECTION:
Science
Math

THINKING PROCESSES:
Observing
Communicating
Relating

BACKGROUND NOTES: There are many ways to conserve water. A dripping faucet can waste a significant amount of water in a given time frame. This lesson involves rate of flow and time as variables in the volume of water gathered from the faucet.

BEFORE YOU START:

1. Preset the sink faucet so that it drips at one second intervals. Be careful to collect any drips that are wasted during the set up time.

2. If the classroom has no sink, use a gallon plastic milk carton as a source of dripping water and use a small pencil to poke a hole in the carton.

MATERIALS:

3 — 8 oz. or 9 oz. plastic cups
clock
sink with faucet
crayons

PROCEDURES:

1. **Droid Link:** Take the question strip from H_2O ..."Are there any drips in this room? I mean the kind that are coming from a leaky faucet. How much water do we waste when a faucet is dripping?"

2. Ask the question and record the responses on the board.

3. Show the plastic cup to the class. Tell them that they are going to use the cup to gather water from the dripping faucet. Ask them to predict the amount of water that will drip into the cup in one minute. Students will use a crayon to color the cup in the "I think" section of the activity sheet.

4. As you begin to gather water, have the students draw in the minute and hour hands on the clock to record the beginning time.

5. After one minute has elapsed, remove the first cup and immediately replace it with another cup that will gather water for four additional minutes. Show the one minute cup to the class. Have them record the time (one minute past the beginning time) and have them color in the level of the water in the cup on the "I found" section.

6. Make a prediction as to the level after a total of 5 minutes of dripping.

7. After 5 minutes of total elapsed time, remove the second cup from the sink and replace it with another empty cup. Pour the contents of the 4 minute cup into the 1 minute cup to equal 5 minutes worth of collected water. Show the class the amount gathered in 5 minutes.

8. Have them record the time and color in the level of water in the "I found" section.

9. Have students color in a prediction in the "after 10 minutes" section. Students could draw in the hands on the clock to show the finishing time.

10. After the additional 5 minutes have elapsed, (total 10 minutes) remove the final cup and turn off the drip. Pour the water into the original cup and recoid the level of water wasted in the total 10 minutes.

CLOSURE:

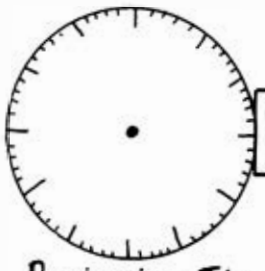
11. Ask ... "How much water would be wasted every 10 minutes if everyone in our class had a dripping faucet at home? How much water would be wasted if our classroom faucet dripped for 20 minutes? 30 minutes? How much water would be wasted if the faucet were dripping twice as fast?"

12. Use the water gathered to water a plant.

13. Discuss the importance of being sure the faucet is turned completely off.

14. Suggest that students check the faucets at home.

15. Answer the question on the answer strip and enter into H_2O and the Student Droid Booklet.



DRIPS

Max Contu 191

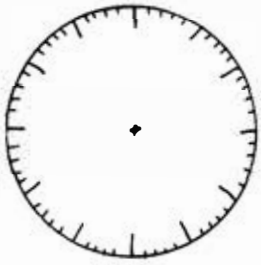
NAME

Beginning Time

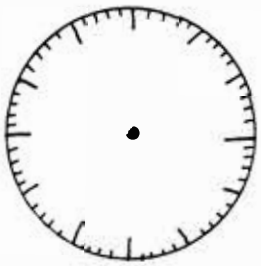
I THINK

I FOUND

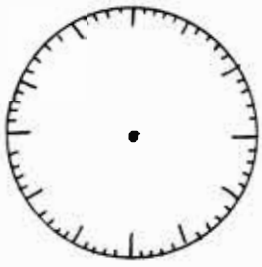
After one minute



After 5 minutes



After 10 minutes



BRUSHING YOUR TEETH AND SAVING WATER

QUESTION: How much water do you use when you brush your teeth?

OBJECTIVE: Students will observe the amount of water used to brush teeth.

ACTIVITY: Students will simulate brushing their teeth while running water is collected in 3 oz. cups.

EXPECTED OUTCOME: Over 30-3 oz. cups of water should be collected during the running water portion of the lesson. 1 cup of water should be collected during the conserving method.

CURRICULUM CONNECTION:
Science
Math
Health

THINKING PROCESSES:
Observing
Communicating
Comparing

MATH STRANDS:
Probability & Statistics (Graphing)
Numbers & Operations (Counting)

BACKGROUND NOTES: An average of 1 gallon of water is used to brush your teeth if the tap is left running while brushing your teeth. To conserve water, people are encouraged to brush their teeth with only 1 cup of water. According to the American Dental Association, your teeth should be brushed for 2 minutes each time. They should be brushed ideally after every meal, but at least twice a day. The correct procedure from the ADA is as follows:

a. "Hold the brush at a 45-degree angle, pointing toward the gum line. Use a gentle, circular motion — almost a wiggle. Don't press too hard.
b. Use short, angled strokes to clean the outer surfaces of the back teeth.
c. Keep brushing with short, angled strokes to remove plaque from the inner surfaces of your back teeth.
d. Scrub the chewing surfaces of your back teeth with the brush held flat.
e. Tilt your brush and use a circular motion to clean the inner surfaces of your front teeth. Brush your tongue — that helps keep your breath fresh."
f. Flossing helps to remove cavity causing plaque from between the teeth and under the gum line.

BEFORE YOU START:

1. Select a student to be "leader." Be sure your "leader" can read the minute hand on a clock or help the leader keep track of the two minutes.

2. If a faucet is not available, bring a half-gallon milk/water container with a pencil-sized hole placed in the bottom to simulate a running faucet.

3. Have at least 40-50 —3 oz. cups separated and available at the sink to be grabbed quickly while the water is running.

MATERIALS:

per class:
40-50 — 3 oz. paper/plastic cups
clock or timer

per group:
1 page — "paper cup strips"
1 — 6" x 36" long tag or butcher paper strips
glue

PROCEDURES:

1. **Droid Link:** Take the question and information strip from H_2O... "Hi boys and girls! Did you know that your dentist wants you to brush your teeth for at least 2 minutes after every meal or at least twice a day? How much water do you use when you brush your teeth?"

2. Discuss the information and question from H_2O. Ask the students how they usually brush their teeth. Discuss how letting the water run while they are brushing their teeth wastes water.

3. Discuss how to brush their teeth (see background information).

4. Tell students that we are going to simulate the brushing of their teeth for 2 minutes and let the faucet run (or the jug release the water) to see how much water is wasted using that method. Tell them that we will be "catching" the water before it goes down the drain in 3 oz. cups and see how many cups are filled in the 2 minute period.

5. Discuss the following procedures:
   a. Select a student to lead the class in brushing their teeth.
   b. Have the students gather at the sink area.
   c. The students will simulate good brushing skills for 2 minutes. The timer will start and stop the brushing.
   d. The teacher will run the water during the entire simulation, quickly collecting all of the water in the 3 oz. cups.

6. Back at their seats, the students will count out loud the number of cups that were filled during the activity.

7. Make a "real graph" of all of the cups used by placing them in a straight row on the floor.

8. Discuss what could be done with the water collected. (Go outside and water some plants, etc.)

9. Discuss "water saving" ways to brush their teeth, such as:
   a. Turning the water "on and off" to quickly rinse their toothbrush.
   b. Using only 1 cup of water, a little at a time, to both rinse their mouth and rinse their toothbrush several times.

10. Go to the sink again and simulate the "ON AND OFF" technique collecting water in a cup. Put on toothpaste, brush, turn on water to rinse brush, brush some more, turn on water quickly to rinse, etc. a few more times. Hopefully, they would have used only about a cup of water.

11. Back at their seats, count out loud the number of cups of water used in this water saving method. (Hopefully only 1 or 2 cups.)

12. Record results on the floor graph.

13. Each group of 2-4 students should make their own "representational" graph by folding a 6" x 36" strip of butcher paper in half lengthwise. Use this fold line as a divider. They should cut out the same number of "cup strips" as were wasted when the water ran. On one side of the graph the number of cups used in the continuous water method are glued and the "on and off" method cups are placed on the other half of the graph. They may label the columns, "Running Water" and "Not Running Water."

14. The students may color each group of 10 cups with a different color of crayon to help in counting and grouping in 10's.

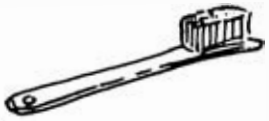
CLOSURE:

15. Discuss each of the water saving methods for brushing your teeth and encourage the students to share these methods with their families.

16. Enter the answer to H_2O's question into H_2O and record it in the Student Droid Booklet.

"CUP STRIPS" FOR GRAPH

Max Cantu '91



Cut out strips to represent the number of cups used when the water ran continuously. Then cut out cup strips to show number of cups used in the "on-off" method. Glue onto long tag or butcher paper strips. Count the cups by 10's coloring each group of 10 in a different color.

Hi boys and girls! Did you know that your dentist wants you to brush your teeth for at least 2 minutes after every meal. How much water do you use when you brush your teeth?

BRUSHING YOUR TEETH AND SAVING WATER

Project time! Let's make something that will help your whole family save water and answer my question. How can I make sure that I take only a 3 minute shower?

SHOWER BAGGIE

SHOWER BAGGIE

QUESTION: How can I make sure I only take a 3 minute shower?

OBJECTIVE: Students will prepare a water conservation tool that they can use in the shower.

ACTIVITY: Students will make a shower timing device that will remind the students and their families to take shorter showers to save water.

EXPECTED OUTCOME: Each student will have a baggie that will serve as a 3 minute timer.

CURRICULUM CONNECTION:
Math—time
Health

THINKING PROCESSES:
Observing
Comparing
Relating

MATH STRANDS:
Measurement

BACKGROUND NOTES: Taking a shower with a regular shower head uses about 6-8 gallons of water per minute. To fill an average bath tub you would use about 24 gallons of water. Therefore, to take a shower that is equal in water use to a bath, you would only take a 3 minute shower.

BEFORE YOU START:

YOUNGER STUDENTS

1. Into one corner of the bottom of a baggie, pre-poke 4 holes through both layers.

2. The shower timer baggie picture that accompanies this lesson shows how it is used. You may want to run off one copy for each group to look at while they make the baggies or give one to each student to take home.

MATERIALS:

per student
1 sandwich size, ziplock baggie
1 glass of water to fill the baggie
1 large paper clip
1 meter string

per group of older students
1 pan/bowl to catch water in during the trial run in the classroom

PROCEDURES:

1. **Droid Link:** Take the question strip from H_2O ... "Project Time! let's make something that will help your whole family save water and answer my question: How can I make sure that I take only a 3 minute shower?"

2. The teacher should discuss saving water by taking shorter showers. Remind students not to turn on the water "full force" but rather have it flow very slowly.

3. Demonstrate how to make the shower baggie as follows:
   a. **Younger students:** Pre-poke 4 holes into a corner of a baggie with a sharp ball point pen or a push pin (wiggle push pin back and forth to make a little larger hole).

      Older students: Poke 4 holes into the corner of a baggie (see "a." above).

   b. Make an S-shaped hook out of a large paper clip (see illustration) and poke it through both sides of the closed, ziplock baggie about 1" from the side of the baggie underneath the ziplock strip and diagonal to the bottom holes.
   c. Thread the string through the paper clip and tie the ends together making a loop to hang the shower baggie from the shower head.

d. Have the students measure down 9 cm from the top edge of the baggie and draw a line (or pre-draw all lines). This is the fill line. Hold the baggie horizontally and fill it up to the fill line. Then let it hang diagonally from the paper clip until it nearly empties. It should take about 3 to 4 minutes for most of the water to leave the baggie. If it stops dripping, it is because the pressure of the water is low and the "surface tension" of the water prevents the water from dripping out.

CLOSURE:

4. **Younger Students:** The teacher demonstrates the baggie timer for the class.

   Older Students: In each group, fill up one of the baggies with the correct amount of water and time how long it takes for that amount of water to leave the baggie. Adjust the number of holes to make sure most of the water is gone after 3-4 minutes.

5. Discuss with the class ways to reduce the amount of water used in the bathtub and around the house in general.

6. Can they think of a way for each of them to reduce their use of water?

7. Enter the answer to the question on a strip of paper and place it into H_2O. Record their answers in their Student Droid Booklet.

SHOWER BAGGIE

SAVING WATER

QUESTION: What are the ways to save water at your home and at school?

OBJECTIVE: Students will identify ways that water is saved and wasted at home and at school.

ACTIVITY: Students will sort the pictures that represent wasted water and those that save water. They will glue them in the appropriate photo albums — either in Wally Waster's or Inspector Saver's.

EXPECTED OUTCOME: Students will have put 4 pictures into Wally Waster's photo album and 4 into Inspector Saver's.

CURRICULUM CONNECTION:
Science
Language arts

THINKING PROCESSES:
Observing
Communicating
Comparing

BEFORE YOU START:
1. If students are not able to record the "Ways I Will Save Water," the teacher may pre-write words to then be traced by the students.

2. Once the paper has been cut and folded correctly, the two fronts of the albums should open onto blank areas for the cut out pictures to be glued.

3. Some teachers may want to enlarge the albums and pictures and make one large class chart or bulletin board instead of, or in addition to, the individual pages.

MATERIALS:
activity sheet
scissors
glue

PROCEDURES:
1. **Droid Link:** Take the question strip from H_2O ... "Can you picture ways to save water? Well, Inspector Saver and Wally Waster had lots of pictures. But, unfortunately, they got all mixed up. Can you help put them in the right book? Our question today is, what are ways to save water at your home and at school?"

2. Review the ways that water is saved and wasted in the home and at school. (see lesson — "Meeting Wally Waster and Inspector Saver")

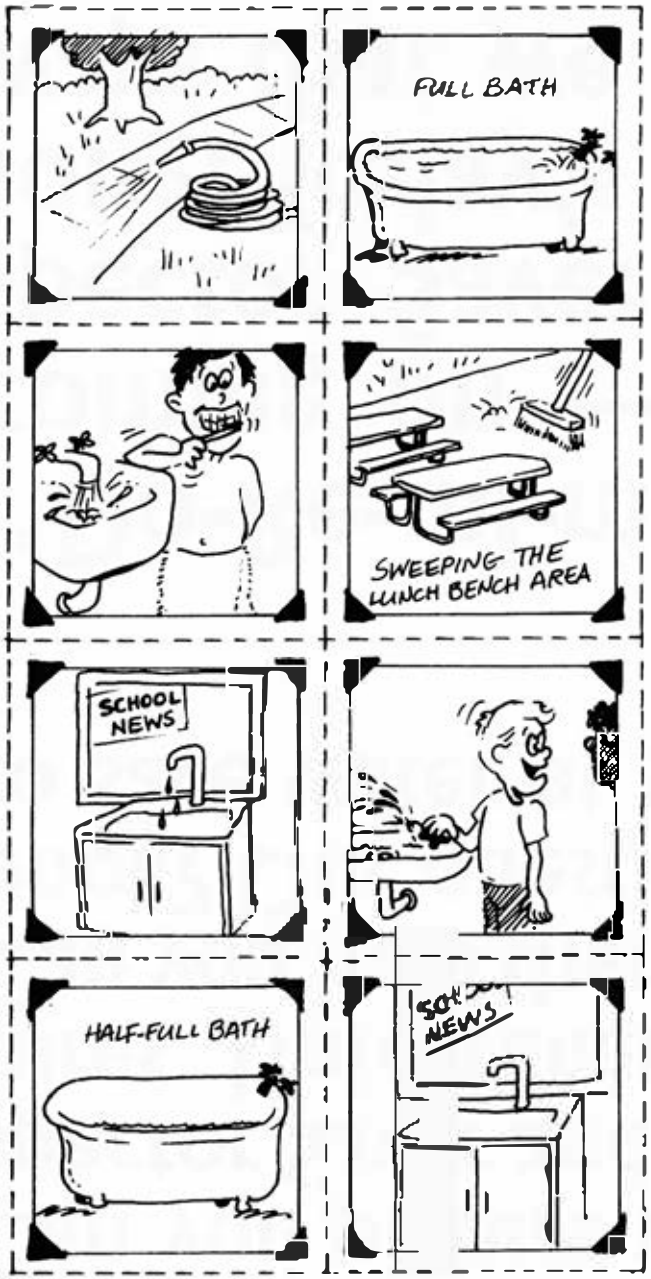
3. Prepare the activity sheet:
   a. Cut off the 8 mini pictures.
   b. Cut the two album covers apart at the cut line.
   c. Fold the albums in towards the unprinted side of the paper.

4. Discuss each picture to be cut and pasted. As a class or individually, decide whose album each picture belongs in.

5. Glue the pictures into the correct album (use the blank side of the paper after opening the cover).

CLOSURE:
6. On the back of the folded albums, students record or trace some ways to save water in their home and at school.

7. Answer the question on a paper strip, enter into H_2O, and record in Student Droid Booklet.



Ways I will save water...

NAME _____

WALLY'S PHOTO ALBUM

INSPECTOR SAVER'S PHOTO ALBUM

Can you picture ways to save water? Well, Inspector Saver and Wally Waster had lots of pictures. Unfortunately, they got all mixed up. Can you help them put the pictures in the right book? Our question today is — What are ways to save water at your home and at school?

SAVING WATER

"Do-Re-mi-mi-mi. . ." I feel a song coming on — Wally Waster and Inspector Saver should both like this song. Today's question is — What are ways that we waste and save water?

CONSERVATION SONG

CONSERVATION SONG

QUESTION: What are ways that we waste and save water?

OBJECTIVE: Students will identify and illustrate ways that water is wasted and ways that it is saved.

ACTIVITY: Students will sing the conservation song and illustrate each stanza.

EXPECTED OUTCOME: Students will have posters for each stanza of the song.

CURRICULUM CONNECTION:
Science
Music
Art

THINKING PROCESSES:
Communicating
Comparing

BEFORE YOU START:
1. This song is sung to the tune of "I've Been Working on the Railroad."

2. Students will be divided into 8 groups for illustrations.

MATERIALS:
A transparency copy of the song or song on a chart
Puppet characters from the "Meeting Wally Waster and Inspector Saver" lesson
Sheets of drawing paper
Crayons/markers

PROCEDURES:
1. **Droid Link:** Take the question strip from H_2O ... "Do-re-mi-mi-mi ... I feel a song coming on ... Wally Waster and Inspector Saver should both like this song. Today's question is ... What are ways that we waste and save water?"

2. Put two labels on the board: "Waste" and "Save." Students can brainstorm ways that we do both and their responses are recorded on the board.

3. Introduce the song, "I've Been Wasting Lots of Water" (to the tune, "I've Been Working on the Railroad") by showing the words on the overhead or on a chart. Use the Wally Waster puppet while singing the wasting stanza and Inspector Saver puppet on the saving stanza. Students sing along filling in the blank portions of the song with their own choices.

4. The song needs illustrations. Each student will be given a part of the song to illustrate. Give each student either one "waste it in the yard, house, bathroom, or sink" or "save it in yard, house, bathroom or sink" location to illustrate.

CLOSURE:
5. Sing the song again with each student showing their pictures as their line of the song is being sung.

6. Answer the question and enter the answer strip into H_2O and the Student Droid Booklet.

Water Waster Song

I've been wasting lots of water,
All the live long day.
I've been wasting lots of water,
As time passes away.
Can't you see my faucet dripping,
Drip, drip, drip, drip, drop.
I've been wasting lots of water,
I should really stop!

- Waste it in the yard,
- Waste it in the house,
- Waste it in the bathroom, too.
- Waste it in the sink,
- Waste it in the _____,
- Whatever should I do?

Conservation Song

I've been saving lots of water
All the live long day.
I've been saving lots of water;
That will help in many ways.
Can't you see me turn the faucet,
So it won't drip drop.
I've been saving lots of water;
And I'll never stop!

- Save it in the yard,
- Save it in the house,
- Save it in the bathroom, too.
- Save it in the sink,
- Save it in the _____,
- I now know what to do.

HOME ACTIVITY

Making a doorknob reminder

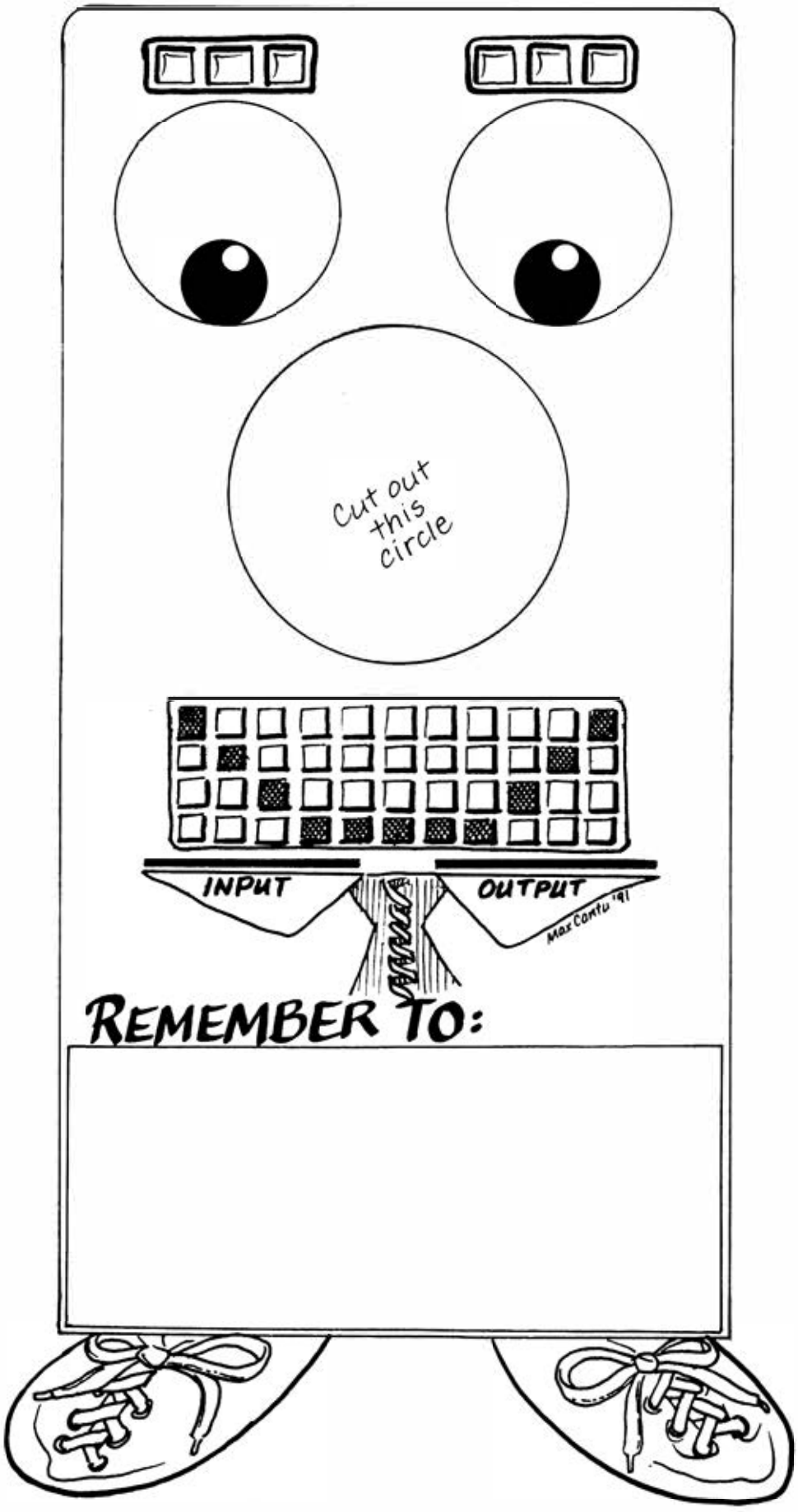
Here is an opportunity to make some water conservation reminders to use at home (try school, too!).

MATERIALS:

per student
doorknob reminder page
glue
scissors
tag or construction paper
crayons

PROCEDURES:

1. Each student receives a doorknob reminder page.
2. Glue it onto tag or construction paper.
3. Cut out the droid-shaped doorknob reminder.
4. The class reviews conservation tips to remember.
5. Students select a conservation tip to draw or write in the empty space.
6. The doorknob reminder is taken home.


Cut out this circle
INPUT
OUTPUT
Max Cantu '91
REMEMBER TO:

CULMINATION

QUESTION: What have you learned about water?

OBJECTIVE: Students will summarize the major concepts and conservation topics learned during the water unit.

ACTIVITY: Students will make picture strips that show the major concepts and conservation ideas learned from this water unit. Students will share the information learned with their family.

EXPECTED OUTCOME: Students will each have a completed review book to share with their families.

CURRICULUM CONNECTION:
Science
Oral language
Art

THINKING PROCESSES:
Communicating

BEFORE YOU START:
1. Make a sample of the pull strip to show to the class.
2. If a concept was not covered in class, the teacher may choose to cover up that panel before copying. The empty panel can be a space for students to record information learned or draw their favorite activity.
3. The teacher will need to copy the badge strip page and cut apart one badge to award to each student at the end of the lesson.

MATERIALS:
activity sheets
crayons
scissors
glue

PROCEDURES:
1. **Droid Link:** The teacher takes the strip out of H_2O,

   "Learning about water
   has been lots of fun.
   But don't think it's over
   'Cause it's just begun.
   When the lessons are done,
   You'll have a neat book
   To share with everyone.
   Bye, kids, it's been fun!"

2. "Here is a way for us to look at all we have learned." Show the sample.
3. Cut out the panels on the dotted lines. You can have the students color them at this point or color them later in the activity during the discussion of the illustrations. Do not record any responses until the discussion of each frame.
4. Glue the edge of page two on top of the edge of page one at the "glue here" mark. Be sure that the illustrations are sequenced 1, 2, 3, 4.
5. Fold the double length strip in half lengthwise along the fold lines with the illustrations facing out.
6. Distribute the "Things I Have Learned About Water" page and have the students cut along the dotted lines.
7. Weave the folded pull strip so that illustration number one weaves up through slit number one from the back of the page and down through slit number two.
8. Center illustration one in the frame. Discuss and fill in a response when needed. Move to frame two. Each subsequent frame will be done in the same manner.
9. After completing the first four frames, remove the strip from the frame and reinsert the other side in the same manner as before.

10. Discussion cues for each frame:

    #1 Water Cycle ... review and color in the water and draw arrows to show the movement of the water through the cycle. Trace the words, "Water Cycle."

    #2 Uses of Water ... review uses.

    #3 Don't Pollute Our Water ... review.

    #4 Drought ... review and color in the puddles of water.

    #5 Turn over to the other side ... Toothbrush ... discuss saving water and fill in the blank.

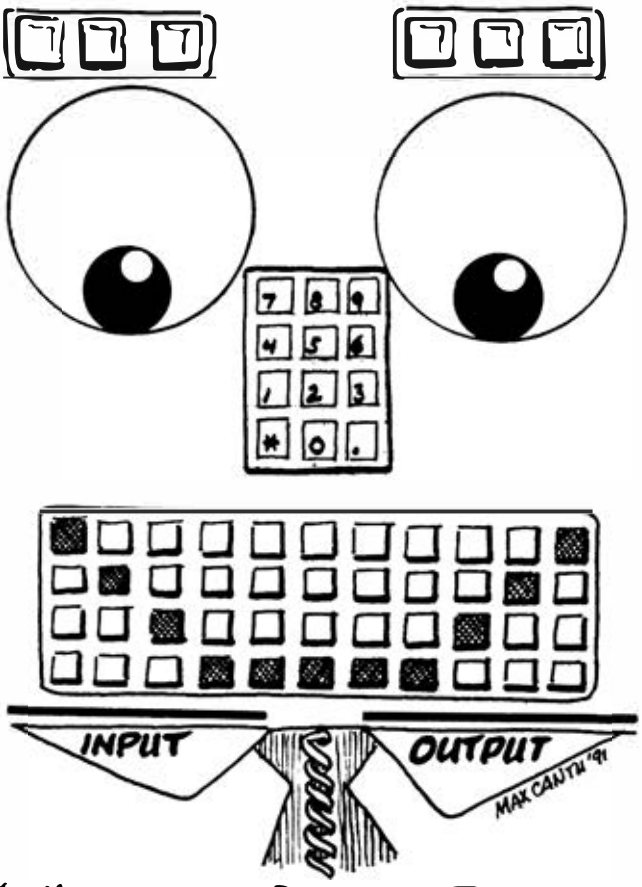
    #6 Bathroom ... discuss and fill in the blank. Some choices are 3 minute shower, filling the tub ½ full or using a filler in the toilet tank.

    #7 Lawn ... discuss and fill in the blank regarding not using water as a toy or to clean the sidewalk.

    #8 We can save water by ... have the students discuss this with their group and fill in this panel. Draw their own picture of how to save water.

CLOSURE:

11. Once the students have completed the panels and discussed each one, they can take it home to share the information orally with their family.
12. Rather than the students inputting a droid answer strip into H_2O this time, H_2O sends out a new message. "You've learned about water and how to care for it ... you have earned an official Water Saver's Badge." A class set of the badges are pulled from H_2O and distributed to each student.



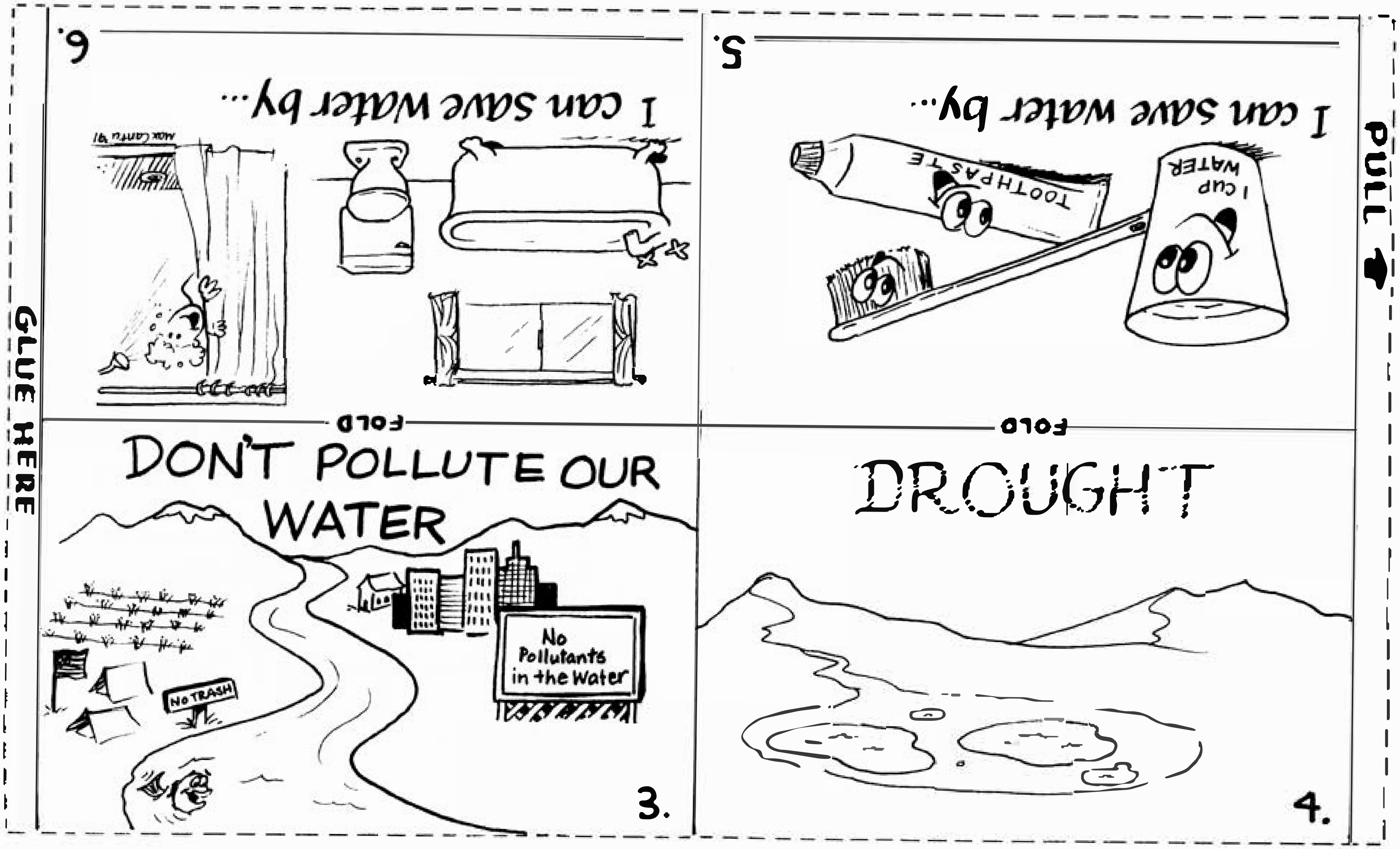
THINGS I HAVE LEARNED ABOUT WATER.

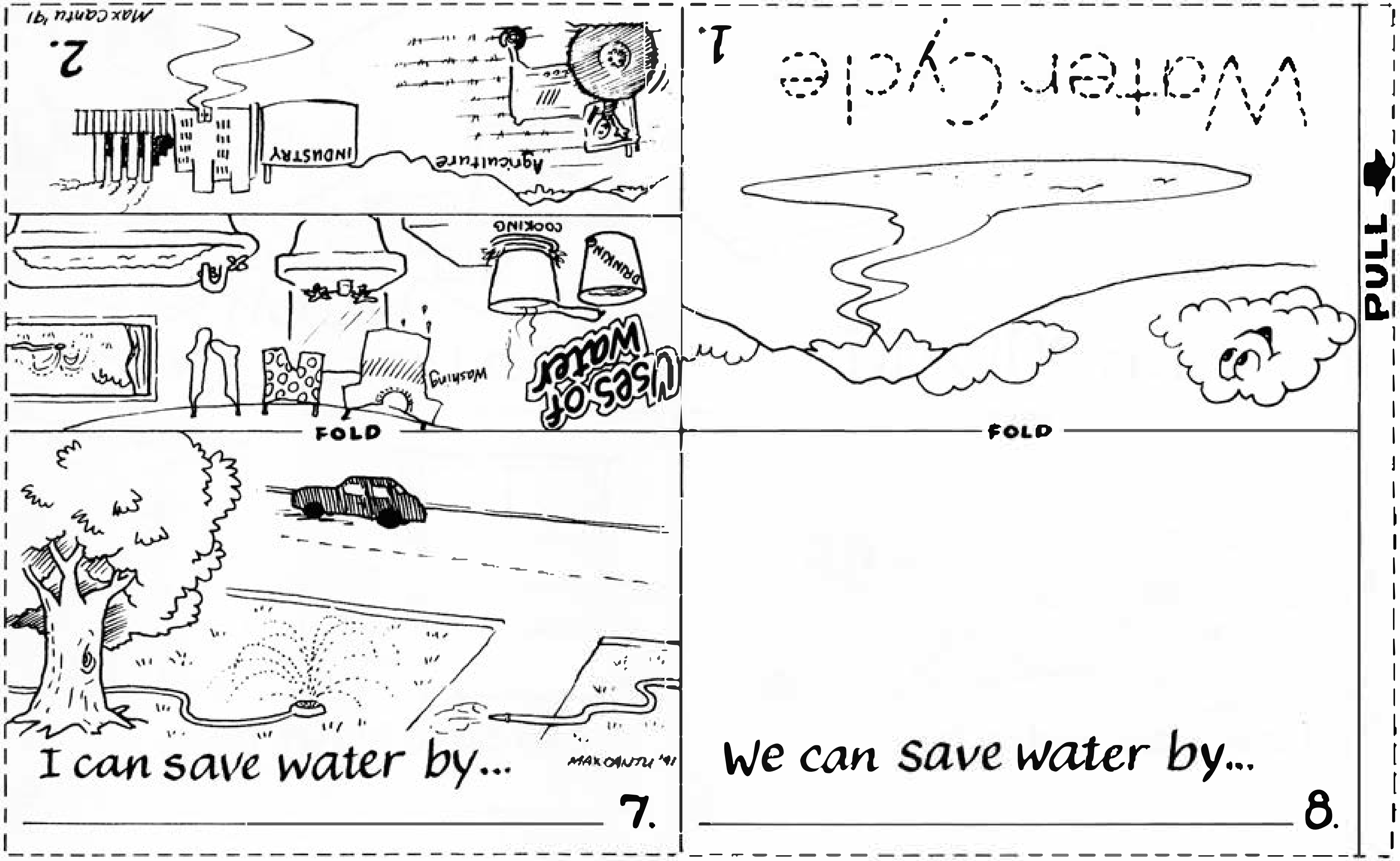
by _____

2.

1.

Page 1

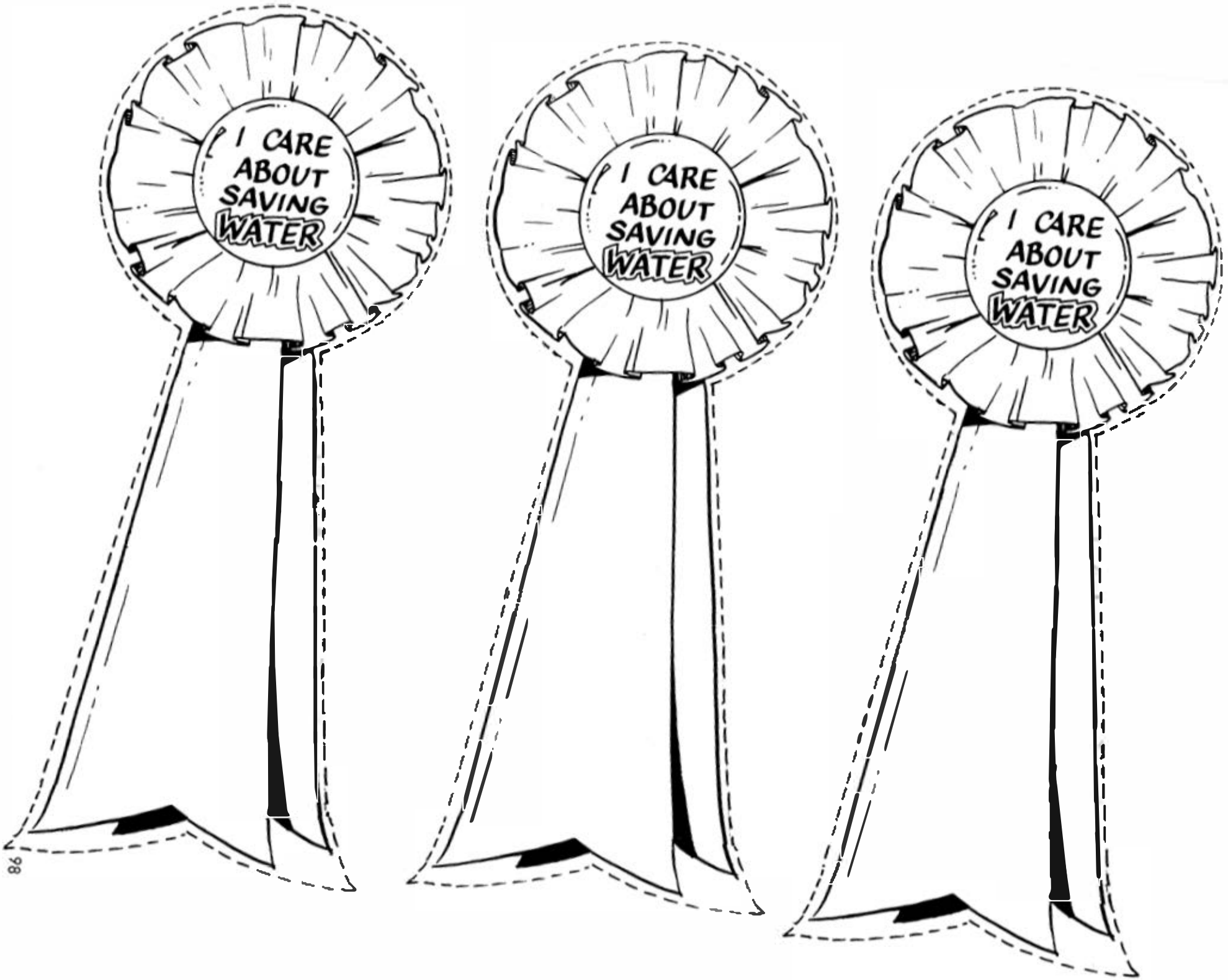

GLUE HERE
6.
I can save water by...
Max Cantu '91
5.
I can save water by...
TOOTHPASTE
I CUP WATER
FOLD
FOLD
DON'T POLLUTE OUR WATER
No Pollutants in the Water
NO TRASH
3.
DROUGHT
4.
PULL


Water Cycle
1.
Max Cantu '91
2.
INDUSTRY
Agriculture
Uses of Water
COOKING
DRINKING
Washing
FOLD
FOLD
I can save water by...
MAX CANTU '91
7.
We can save water by...
8.
PULL

Page 2

Learning about water has been lots of fun. But don't think it's over 'cause it's just begun. When the lessons are done, you'll have a neat book to share with everyone. Bye, bye kids it's been fun.

You've learned about water and how to care for it — you have earned an official "Water Saver's Badge."


I CARE ABOUT SAVING WATER
I CARE ABOUT SAVING WATER
I CARE ABOUT SAVING WATER

Notes

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Notes

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