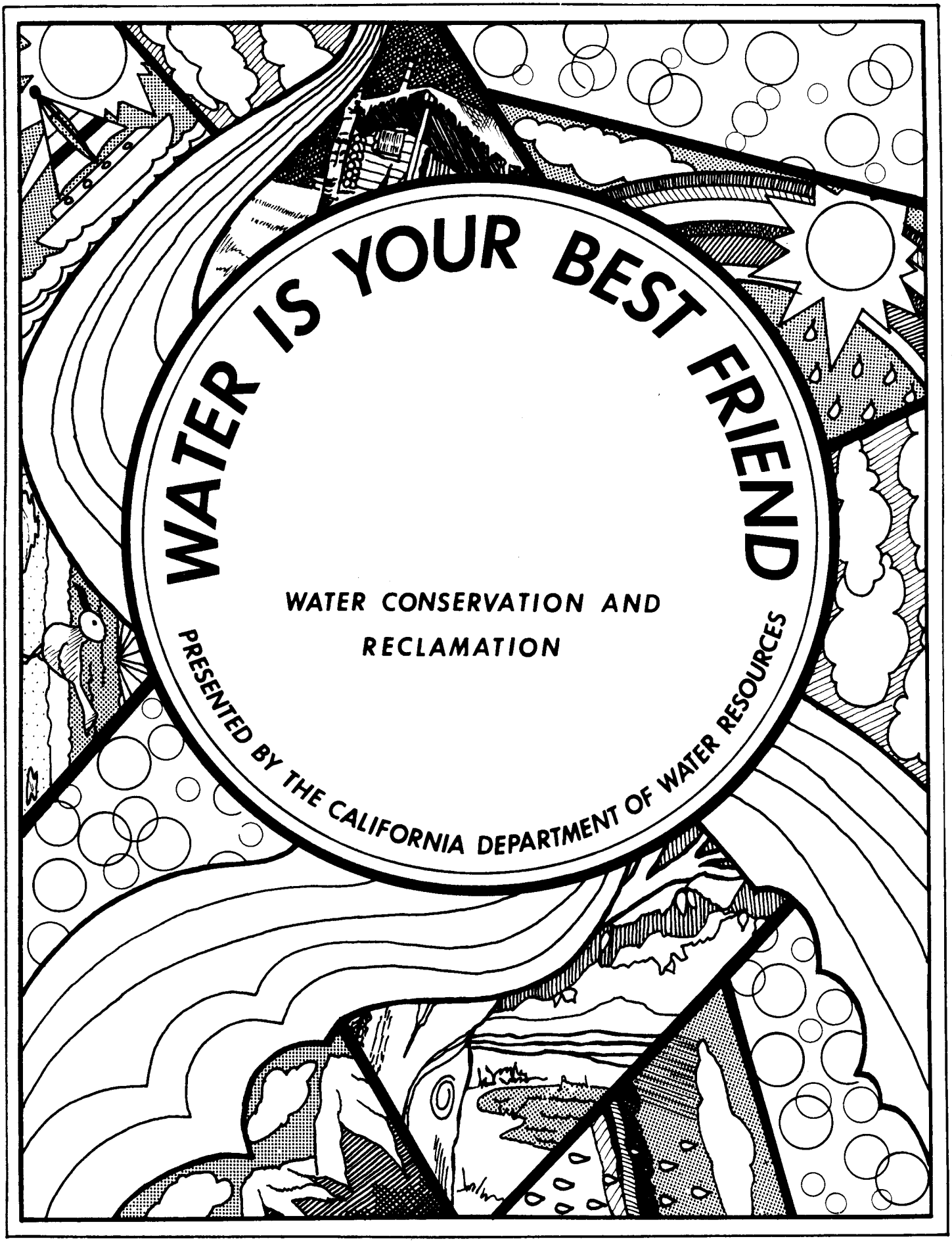
WATER IS YOUR BEST FRIEND
WATER CONSERVATION AND
RECLAMATION
PRESENTED BY THE CALIFORNIA DEPARTMENT OF WATER RESOURCES

WATER IS YOUR BEST FRIEND

by

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WATER IS YOUR BEST FRIEND

Teacher's Overview

Why Study Water Conservation and Reclamation in the Primary Grades?

The first Californians (Indians), the padres and then the pioneers always followed water. They settled by springs, streams and lakes. Yet today California's population centers are concentrated far from natural sources of water. So millions of dollars have been and are being spent to carry water to where most people are. As our towns and cities grow, water must inevitably become scarcer and more expensive. While oil or coal have been called "black gold," fertile soil, "brown gold," water soon may be called "white gold."

Water conservation is therefore essential for homes, industry, and agriculture.

How could you teach water conservation and reuse beginning with young children? We have built this unit around concrete or "hands on" learning so essential with small children. Incremental experiences have been designed to develop awareness of water as an essential and precious resource. Concepts of wise use, conservation and reuse initiated in primary grades can hopefully produce wiser, water-thrifty adult citizens.

If you like, the material may be used as a short term science unit. However, because of suggested interweaving with other curriculum areas (e.g., art, music, math, language, social studies), we recommend using the material over a longer period. This straightforward method also facilitates feedback from suggested home-school interactions of sample water conservation practices.

Tentative answers to questions to be posed by the teacher are furnished only as suggestions to promote children's thinking, and not as the one and only response to a guessing game.

WATER IS YOUR BEST FRIEND, Introduction, Part I

This part is intended to develop young children's awareness of water as a true friend, an abstract concept to be developed through concrete experiences. We have designed simple concrete experiences for you to convey the internal roles of water in our bodies and in plants.

We have chosen to develop concepts basic to a child's understanding and developmental level for the 6-9 year span. In this age span a child is in a concrete stage of learning; just beginning at age 8-9 to make transitions to abstract thinking. To small children, abstract is anything they can't see, feel, touch, taste, or smell.

Children are helped to become aware of the aesthetic and recreational values of water in their own daily lives.

Children are introduced to home and school water use and conservation through direct experiences.

Throughout, your writers have incorporated means through which all the major aspects of the primary school curriculum can be met.

WATER IS YOUR BEST FRIEND

Part I

LESSON 1 — How Do You Know Water Is Your Best Friend?

Key Idea: We always have water in our bodies. We put it there when we eat and drink.

Activity: How do we get water inside us?

How do we know that it is there?

Materials: Celery sticks for snacks,

Extra celery to set aside for Lesson 2

Package of Koolaid

Pitcher of water

Paper cup for each child

Measuring cup

8 water glasses

Kitchen scale.

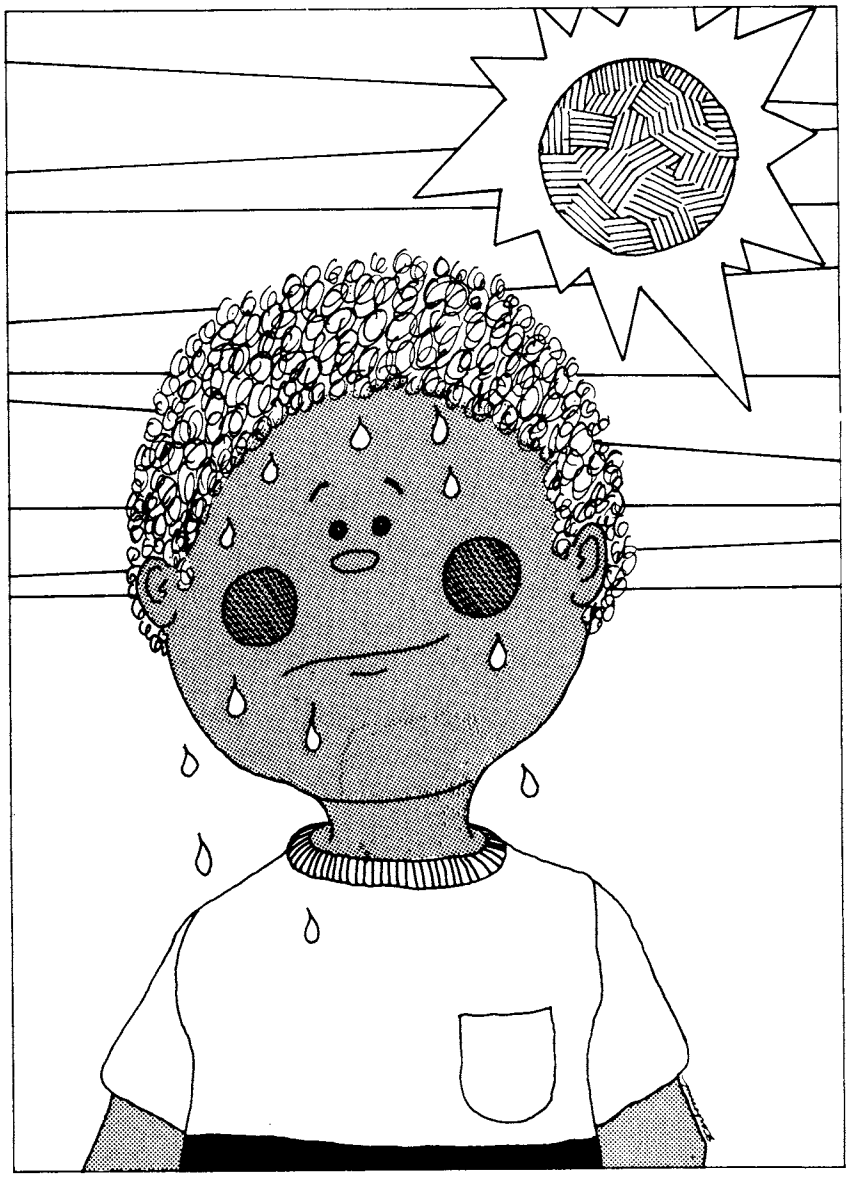
Procedure: For the class snack, have a child help you mix and measure Koolaid in front of the class. Serve the Koolaid and celery sticks. After snacks ask the children questions such as: How much water did we use to mix the Koolaid? Why did we use it? (so we could drink it) Where is the water now? (inside us) How did we put water into our bodies when we ate the celery? (celery has water in it) How can we show that eating celery gives us water? Weigh the extra celery, label it and spread it out to dry for several days.* Ask the children what they think will happen to it; how it may look different. To demonstrate how much water we should take in daily, have a child pour and set out 8 glasses of water.

* If a scale is not available in Lesson 2 children can compare weight differences by holding dry celery in one hand, fresh celery in the other.

Water is Your Best Friend, Part I

Explain: This is how much water your body needs every day. Your body gets much of its water from "water you eat." More than half your body is fluid, most of it water (70%); grownups are less "juicy."

Continue discussion by asking: What did you eat today that was partly water? (e.g., milk, 87%, bread, 50%, wheat grain cereal, 15%). How does the water in these foods get into your body? How do you know there is water in your body? How does your skin feel on a hot day, or when you have been running or playing hard? When you cry, where do the tears come from? To extend childrens' study of water, you may wish to send home copies of the following letter to parents:



Water Is Your Best Friend, Part I

Dear Parents,

Our class is learning about water and why it is our best friend. Your assistance could make our school study more meaningful to your child. Would you help your child become more aware of the following at home:

your different household uses of water

where you use the most water

your water meter

your water bills for different seasons (if available)

some ways you conserve water

some ways you reclaim or reuse water.

If you have additional information for our study, please tell us.

Thank you,

_____

Teacher of Eager Learners

Water Is Your Best Friend, Part I

Extension: How can we show that plants too use water?

Materials: Potted plant

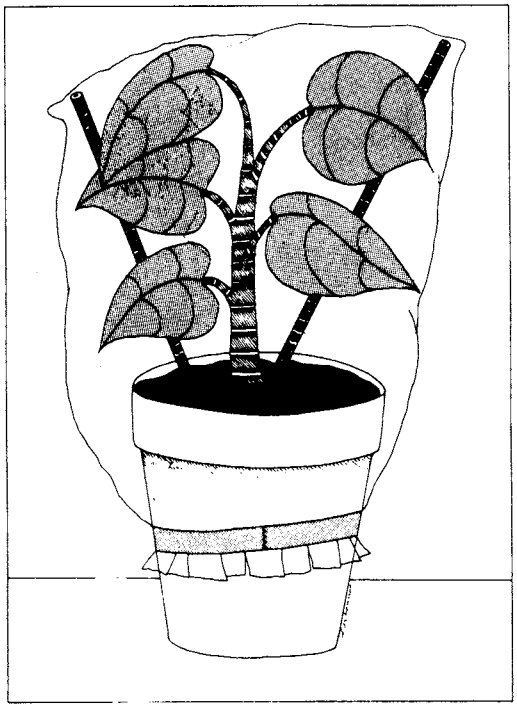
Plastic bag

Sticks to keep bag from touching leaves

Tape

Procedure: Tape plastic bag "tent" over a potted plant. Set the plant in a sunny window and watch water drops form inside the bag. When condensation is clearly visible, ask: How do we know that this plant has water inside it? (small drops of water condense inside the sealed bag) Where does the water come from? (from the plant leaves and from the soil) How does a plant use its water? (just as you do, to carry food to growing cells) When we eat parts of plants--leaves, stems, fruits and blossoms--where does the plant's water go? (into you) How else do plants give back some of their water to us? (Accept various answers and indicate Lesson 3 extension will provide the answer.)

Plants, like people, need water to live; they also store it and slowly release it.



Water Is Your Best Friend, Part I

LESSON 2 How Does Water Help You?

Key Idea: Water is the best carry-all and cleaner for your body.

Activity: How does water move through your body?

(through veins, arteries, cells, organs)

What does water carry through your body?

(dissolved food and wastes)

Materials: Dried celery sticks from Lesson 1

Fresh celery stalks set in red food color for overnight

Kitchen scale

Procedure: As children examine the dried celery, ask: What happened to our celery? (it looks dried) Will it weigh more or less than before? Why? Weigh and compare with that recorded in Lesson 1. Have children hold dried celery in one hand and fresh celery in the other, if a scale isn't available. How do we know now that celery contains water? Where did the celery keep its water? To show how water moves up from the ground into plants, let children examine the celery which has been standing in the red solution.

Explain: The red lines in the stalk show where water travels in plants. These are the plant's "pipe lines." Water in the plants' pipe lines carries dissolved food from the soil throughout the plant. Let the children now examine the plants and weeds pulled from the garden. Help them imagine how the "pipe system" begins in the tiniest root hairs. These take in dissolved plant foods and carry them all over the plant where growing cells need feeding. To help children understand their own "pipe system," have them look at the veins in their wrists. Ask: Can you name other parts of your body's pipe system? (veins, arteries, tissue, organs, etc.) How does your pipe system get its water? (from what you eat and drink) What would happen if you stopped eating and drinking?

Water Is Your Best Friend, Part I

Extension 1:

Activity: Why do we need water to keep us clean inside and out?

Materials: Drawing paper for each child

Procedure: To help children comprehend all of water's body-cleaning roles, ask: What happens when dust gets in your eyes? (eyes water) Where does this water come from? (tear ducts) How else does water help clean inside your body? (saliva, perspiration, wastes) How many ways do we use water to clean at school? At home? Make a chalkboard list of these ways. Distribute drawing paper for children to fold into quarters and draw four ways water helps us clean things. Make a bulletin board display of the drawings.

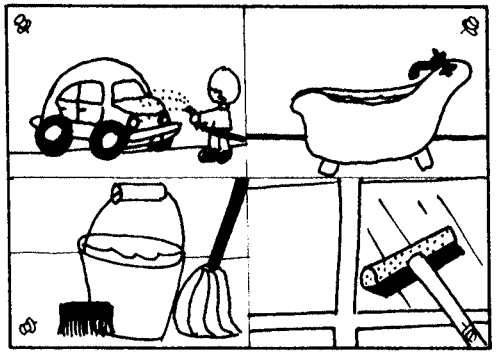
Extension 2: What would we do without water?

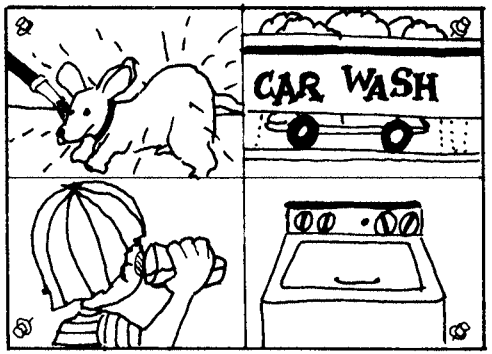
Material: Writing paper for each child

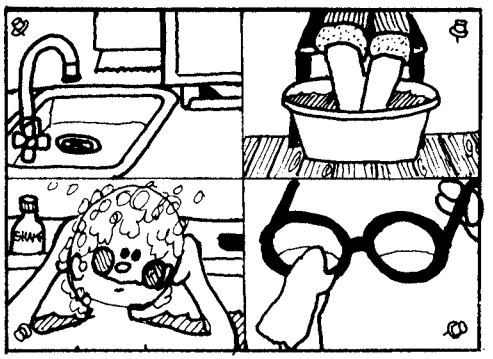
Procedure: Have children dictate or write individual stories entitled "A Day Without Water." Read the stories to the class. So that children may continue to enjoy their stories, assemble them in a book for the class library. Note: this is not a scrap book--it provides good, meaningful reading.

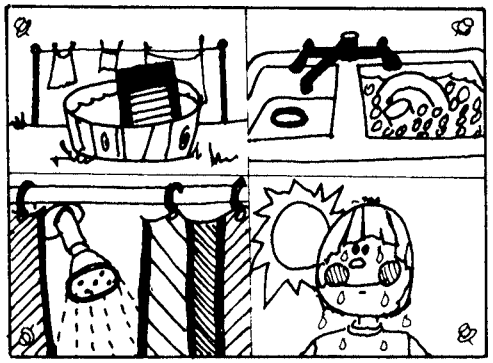
Explain: Our bodies need water to carry food substances around, as well as for internal and external cleaning. Without water children could not "go and grow." Water carries food substances to body cells. Water helps us keep clean inside and out.

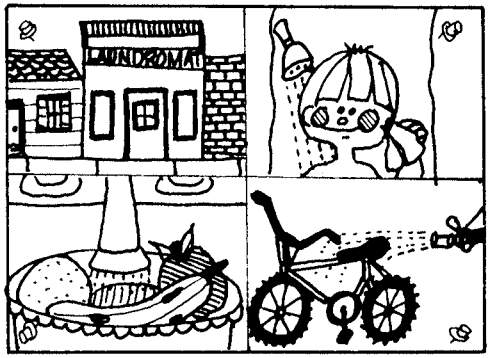
HOW WATER CLEANS

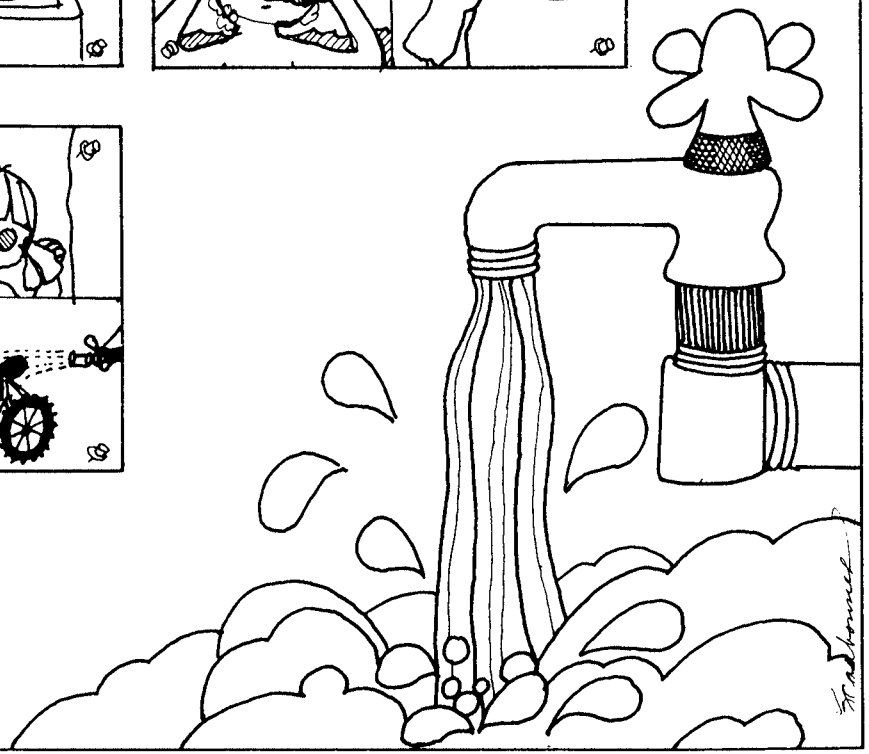












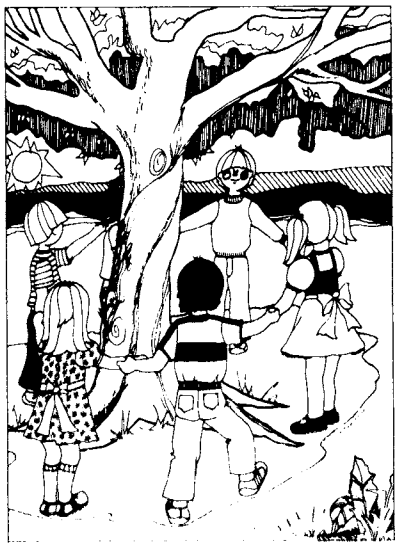
Water is Your Best Friend, Part I

Lesson 3 How Does Water Play With You?

Key Idea: Water is a playmate as well as a helper.

Procedure: Take the children on a short walk around the school grounds or the neighborhood. Have them think how water makes the area look better. On return, ask: What did you see that needs a lot of water to look good? (trees, lawn, etc.) What did you see that needs little water? How do they get water? (sprinklers, hoses, rain) What are other ways you like water or use it for play? (swimming, picnicking, fishing, boating, etc.) How does water come to some of your favorite water play places? (stream, pipe, reservoir) What are some ways you know water is a fun friend? (it feels good; it is pretty; it cools you) How does it play with you? (it cools you on hot days, it floats you or your boat, it hides fish, when you go fishing).

Extension: Why does it feel good to be under a tree on hot days?



Materials: A large tree

Procedure: Locate the biggest tree on your playground. Have the children walk a wide circle around it long the "drip line." This invisible line is where the outer canopy of tree leaves sheds rain. Tree roots generally reach as far as the drip line and act like a huge sponge to soak up rain. On a hot day a big tree may evaporate or release over a thousand gallons of water into the air. Ask children to think why on hot days it is so nice to sit under a big tree or on a green lawn (they both evaporate water which cools the air).

So What? Water is good to us by providing cool shade and recreation through swimming, boating, skiing, skating, etc. Water is a playmate as well as a helper.

WATER IS YOUR BEST FRIEND, Introduction, Part II

Water Comes Three Ways (Wears Three Different Costumes)

For Halloween, small children love to wear masks and costumes to fool their friends. In this section children become acquainted with water in three different guises, water as solid (ice or snow), and gas (water vapor) as well as in its familiar liquid form.

This constant change of form in nature powers our all-important water cycle. Although 7/8 of our world is covered with water, we would quickly use up our supply of fresh water, were it not for the water cycle: e.g., water in response to sun's heat, evaporating from the ocean, rising, cooling and condensing as a cloud, falling again as rain or snow; snow packs at the Poles and in the high mountains, "banking" accumulated snowfall.

Considering the developmental level of the child in the 6-9 year span, we feel strongly that an understanding gained through this section about some properties of water will result in a more meaningful introduction to water conservation and reclamation in Part III.

Although the properties of water might be regarded as science, one does not have to be conversant with science to try these lessons--only conversant with the thinking, feelings and perceptions of young children.

Like Part I this section involves most of the primary grade curriculum and can be handled as part of the normal daily program in your planning.

In each part of the study you will find utilization and application of primary level skills for oral and written languages, math and science, art, music and dramatic expression, health and safety.

WATER IS YOUR BEST FRIEND

Part II

WATER WEARS THREE COSTUMES

LESSON 1 — Why Do We Call Water a Liquid?

Key Ideas:

Water pours

Water fits its containers

Water dissolves some things

Water is absorbed by some things

Water has weight

Water can lift and carry things

Activity: Water washes. What else can it do?

Materials: For each group of children:
(see note in Procedure 1 below)

Plastic dishpan or other sizeable container of water

Paper towels and wax paper

Cloth squares, about 2 x 4 inches

Plastic flower pot holding an inch of rice on top of folded paper towel to cover drainage holes in bottom

Plastic flower pot with an inch of soil in bottom

Small plastic block

Small wood block

Food coloring

Two sugar cubes

Eye dropper

Water Wears Three Costumes, Part II

Materials: (continued)

Plastic measuring cup

3 tablespoons of vegetable oil

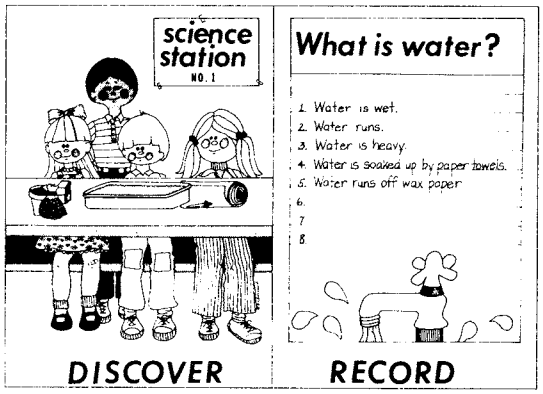
Procedure 1:

Set up several areas in the classroom, each having a set of the above materials. Allow time for them to see how many things they can discover about water, using materials available. Reassemble the class and discuss discoveries. For example, ask what happened to water dropped or poured on paper towel, wax paper, cloth. What happened to water poured over rice? (nothing) Through soil? (turned muddy) What happened to food coloring, sugar cubes, vegetable oil, plastic or wood block placed in water? Introduce the word liquid. Write it on the chalkboard and ask: What other liquids do we know? How can you tell something is a liquid? How might we use water left over from our discoveries? (to watch how water behaves on other materials, to clean up)

Note for Procedure 1. Depending on the group, the teacher may wish to select a small group of children to demonstrate the procedure, as a model for the class to follow as described.

Procedure:

Record children's discoveries on a class chart or by having children write individual or group discovery stories. Be sure to display the chart and/or stories. Individual stories may be stapled together for a class library book for spare-time rereading.



Extension: How heavy is water?

Materials: Kitchen scale

Measuring cups

Clear container

Procedure:

In Part I, children saw that 8 glasses of water are the recommended daily intake. Weigh a container which will hold 8 glasses, first empty, then full of water. And/or since children perceive both air and water as transparent, weigh an inflated clear balloon or air-filled plastic bag. Weigh another balloon or bag full of water.

Water Wears Three Costumes, Part II

Procedure: Weigh each form of water. Why is solid heavier? (molecules are more compact)

So What? When water gets very cold, it turns into solid form.

What if water didn't turn into ice or snow?

How is ice or snow a kind of water bank?

LESSON 3 When Water Turns Into a Gas (water vapor)

Key Idea: When water gets very warm, it turns into water vapor (a gas).

Activity: Moisture in our breath

Procedure: Exhale close to the chalkboard so that moisture from your breath makes a dark, wet spot. Trace the spot with chalk and ask why the spot is darker than the rest of the board? Where did the moisture come from? (inside the lungs*) Fan the spot to make the molecules move faster and watch it disappear. Introduce the word evaporation. Write it on the board and clap out the syllables as children say it. Discuss the root word vapor. What are some ways you can make water evaporate or jump into the air? (heating, boiling) If you have a bad chest cold, how does your parent make steam to make you feel better? (heating water in a vaporizer).

Activity: How does evaporation help us when we paint?

Materials: Paint paper for each child

Water colors and brushes

Small water containers

Sink stopper

* Moist lung tissue lets gases of air dissolve to pass in and out of our bodies.

Water Wears Three Costumes, Part II

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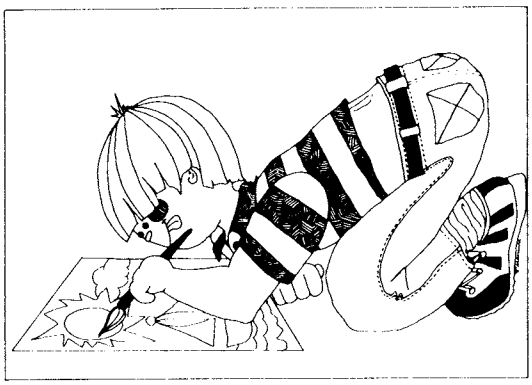


Procedure: Have children paint a picture of their favorite water play activities. To show how much water is used for paint cleanup, stop up the sink before children wash hands, brushes or water cups. Then follow with class discussion on how water was used. How did we use water to mix our paint and spread it? How much water did we use to clean up? How might we have used less? What became of the sink water when we pulled the stopper? What if the water we used to paint did not evaporate?

Activity: Where did the water go from our paintings?

Materials: Children's pictures from previous activity.

Clothesline

Clothespin for each child

Procedure: To share the paintings, string the clotheslines across the chalkboard at children's eye level. As children finish, let each child hang his/her picture with a clothespin. Allow time for children to walk by and enjoy each other's pictures. Then ask: What kinds of "playing with water" do our pictures show? Where do you go for this kind of water play? Where did the water go that we used to mix our paints?

When we made water very cold it became a <u>solid</u>. When water is spread out to dry, as in our pictures, it evaporates or turns into an invisible gas, water vapor. Some of the tiny drops which jumped into the air are still around us even though we can't see them. What if water didn't like to jump away and hide when it gets too warm? (There would be no water vapor to make clouds for rain or snow.)

Water Wears Three Costumes, Part II

Extension: Why do some things dry so much faster than others?

Materials: Three or more cloth samples of different thickness or texture (some nylon, some cotton, etc.).

Procedure: Which of these will dry fastest? Slowest? Ask for volunteers to wash (rinse) the samples and hang them out to dry. Keeping track of drying time might be an interesting record for some. Examining cloth with a magnifying glass might interest others. The weave and texture under magnification is surprising.

What is the best time of day to dry things outdoors? Why? What is the worst time of day to water plants outdoors? Why?

LESSON 4 How Does Water Vapor Change Into Liquid Water?

Key Idea: Water becomes an invisible gas and returns to a liquid.

Activity: Now You See It and Now You Don't

How can we make water go away and come back?

Materials: Two glass tumblers or clear jars

Small amount of colored water

Eye dropper

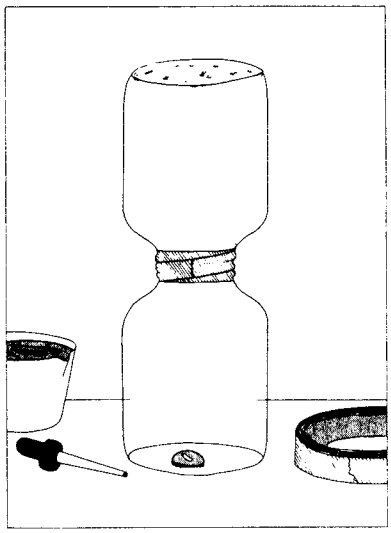
Sticky tape

Bowl with about an inch of ice water

Procedure 1: To demonstrate for the class, put one drop of colored water (for visibility) in the bottom of a glass, tape the other glass on top, closing the gap carefully. Set the glasses in a warm place, e.g., sunny windowsill or near a radiator. Ask questions, such as: What do you think will happen to the(water in the jar? If it disappears, where could it have gone? into the air in the jar, as water vapor) How do you think we might get the drop out of hiding (in the air)?

Water Wears Three Costumes, Part II

Procedure 2: When the drop has evaporated (disappeared) discuss children's suggestions for bringing it back. When cooling is suggested, set the glass in the bowl of ice water. Since our water drop likes to hide, we may have to wait 10-15 minutes. While waiting, ask: What made our drop of water jump into hiding? (warm air) When liquid water turns into water vapor, what word do we use? (evaporation) Recall use of term in Lesson 3. What are we using now to make the water drop come back? (cooling) What does cooling do to water vapor? It makes the tiny particles or molecules condense or get closer together.



Introduce the word condensation by writing it on the board. Then say it together and clap out the syllables. Repeat the illustration (Lesson 3) of condensation-evaporation by asking a child to exhale on the blackboard, or window. Outline the dark spot made by moisture from the breath. Ask children to breathe out. Why doesn't this moisture show now? The water droplets jump away into the air around you. What made them show on the blackboard as a dark spot? Ask a child or two to touch the blackboard, then hold your hand in front of your mouth. Which is cooler? (the blackboard) What did we do to our glass to bring back the water drop? We cooled it with ice water.

Extension: How could we act out evaporation or condensation?

Ask your friends to guess which you're acting out (e.g., fanning something--evaporation, or blowing on a window--condensation).

Materials: A piece of newsprint (plain) for each child

Procedure: Children fold the sheet in half. Label one half condensation, the other, evaporation. Let individuals or small groups plan and act out an activity to demonstrate one or the other. The other children hold up the correct

EVAPORATION
CONDENSATION

Water Wears Three Costumes, Part II

Procedure: (continued) word on their papers to show they recognize the process being shown.

Extension 2: Children may enjoy acting out liquid water molecules, walking about in a small group. Others may act out water vapor molecules, moving faster, e.g., running on the playground. Ask: How would you act out water molecules in snow or ice? (standing close together, moving slowly).

So What? Cooling invisible water vapor drops slows the molecules and brings them back in a more condensed form as liquid water (condensation). Heating liquid water speeds up the molecules, spreading them further apart and making them invisible again (evaporation).

LESSON 2 What Is the Water Cycle?

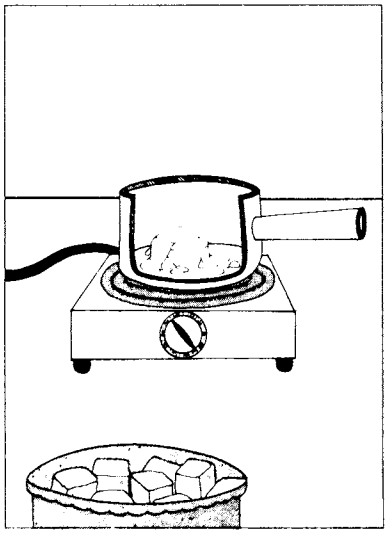
Key Idea: Water changes form to water vapor as the surrounding temperature rises, and cools back to liquid, and cools still further to snow or ice, warms back to liquid, and around and around, a never ending cycle without which we would quickly run out of water.

Activity: How can we use water to make a cloud?

Materials: Hot plate

Saucepan

Ice cubes



Procedure: Put ice cubes in saucepan on hot plate. As helper children watch ice melt, ask: What is making the ice turn back into water? (warmth) If we let the water from melted ice boil, what third form will water molecules take? (water vapor) As the water vapor rises, will it get warmer or cooler? (cooler outdoors) Children may wish to share experiences of cooler air in the mountains.

Water Wears Three Costumes, Part II

Procedure: (continued)

If our water vapor flies very high where it is cooler would it condense or evaporate? (condense as it cools) If you see a cloud, would water drops have condensed or evaporated to make the cloud? (condense) If we could catch a cloud and freeze it, what might we make? (snowflakes) Most clouds we see in California make rain (condense enough) because the tiny water drops in it join hands to make rain. (The water droplets became cooler as they rose, slowed, moved closer together, became heavier, and fell.)

Write these sentences on the board or read aloud. Ask children to complete them.

"Warmth makes water _____"(evaporate).

"Coolness makes water _____"(condense).

Extension: How do water droplets join hands to make rain?

Materials: A cup of Koolaid or thin paint

Aluminum foil pans or small sheets of foil

Drinking straws

Procedure 2: Demonstrate for children how to use straws to put drops of liquid on the foil. Use the straw to push the small droplets together to make big, heavy drops. When the drops in a cloud get big and heavy enough, they are apt to fall as rain.

Extension 2: What are some different cloud forms? (If possible, use this activity for a day of clouds.)

Materials: "The Cloud Book" by de Paola, Scholastic Book Services, 1975, or other picture story book on clouds

Light blue construction paper sheets

Cotton and paste

Procedure 3: Are all clouds the same? (no) Ask children to describe some they have seen. Show pictures of 4 main types: cirrus, cumulus, stratus and nimbus.
Weather permitting, let the children make pictures of clouds they see outdoors, using cotton pasted to blue background. Later, display (as in clothline walkby Lesson 3).

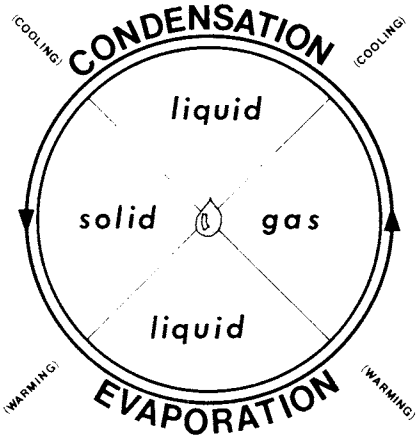
Water Wears Three Costumes, Part II

Activity: What makes water cycle go round and round?

Materials: Drawing paper for each child.

Chart of water cycle enclosed for drawing reference on Procedure 4. Display on Procedure 5.

Procedure 4: Draw a large circle on the blackboard and label as shown. Where on this circle do you see the label for solid water? What can change it to liquid? Where do you see the label for water as a gas? What can change it back to liquid? Where do you see labels for liquid water? What changed in each place on the circle? Ask a child to point out solid water on the diagram, then trace and describe its path. Do the same with water in gas and liquid form. Where are evaporation and/or condensation happening around us every day (clothes drying, ice cubes freezing, clouds forming)? What if evaporation or condensation didn't happen around us all the time? What if water was only a liquid? (no snow, clouds, rain--no water supply)



For children to share their knowledge of the water cycle at home, allow time for them to draw and label a copy of the water cycle to take home. Some children may enjoy drawing examples of water's "changes of costume."

Procedure 5: To reinforce children's concepts of the natural everyday operation of the water cycle around them, display the enclosed large chart. Ask them to examine the chart (picture) to tell where evaporation is taking place and what might cause it. Where would water freeze and why? Where is water heaviest? Lightest? Ask a child to locate on the chart where a raindrop would start and trace its complete path. Follow the same procedure with water as fog or mist, a snowflake, and a spring or stream water.

Take children outdoors to tell you where they know the water cycle is at work.

Comment: All the fresh earth water has now, it has always had. Earth gets no new supplies from space--the astronauts found a dry, dry Moon.

Water Wears Three Costumes, Part II

Extension 1: At what temperature does water change to a solid? A gas?

Materials: Large class thermometer

Procedure: Give children an opportunity to examine the thermometer. Draw a simplified blackboard sketch showing the boiling point (212^{o}F. or 100^{o} Celsius); the freezing point (32^{o}F. or 0^{o} Celsius). Point out where the temperature should be when liquid water turns to gas (high or low?); when liquid turns to ice (low or high?); the place on the scale where water changes to ice; water changes to water vapor.

Ask children to estimate outdoor temperatures and to compare them with boiling and freezing points.

Extension 2: What are some sounds of water?

Materials: Record player

A record of your choice

Drawing paper for each child

Procedure: To afford another opportunity for children to express their awareness of water in its different guises, ask them to listen with eyes closed and picture the form of water the music seems to suggest to them. Distribute the paper for children to draw what they pictured as you replay the record. Allow time for children to share their pictures.

So What? As air temperature changes, the water cycle is powered and our familiar liquid evaporates into the air as a gas; the gas water vapor cools and condenses back into liquid; or liquid cools until it becomes solid ice or snow crystals. These warm and melt back into liquid. This provides rain to replenish our water supplies, and snow to store water for our future supplies.

WATER IS YOUR BEST FRIEND, Introduction, Part III

A good friend like water deserves our attention and care. Our state is like a water mosaic, water abundant in some places and lacking in others. Most of the state's rainfall comes north of the Bay area, the northern half of the state. Most of the large population centers and agriculture are in the south, so water has to be carried to them by elaborate and costly water systems. Indeed, with its network of canals, aqueducts and huge pipelines, the state water system reminds us somewhat of the body's circulatory system, the major sources of blood and blood vessels shrinking into tiny capillaries to supply the skin and extremities.

What are ways we can catch and store our state's normal quota of rain? Our mountain ranges, our forests and indeed every bit of our plant cover help us "bank" rainfall. Especially where our rains fall mainly in winter, it is essential to hold back some of our winter water supply. A statewide coordinated system of reservoirs holds back precious stores of water to get us through the dry months. Much water is needed to raise food crops, and operate our industries, as well as to meet individual needs.

With an increasing population, existing water supplies must stretch to meet these additional needs. The energy required to heat and transport the water must also be considered. Therefore, preventing the waste of water and learning how to conserve and reclaim water for reuse is an essential course of study.

This section attempts to provide simple, concrete experiences to develop with young children abstract concepts of water conservation and reclamation; for example, making the "running water walk" with lawnside miniature "catch basins." Children are introduced to methods of water use and conservation at home and at school. They become "detectives" looking for water-wasting. They make a classroom model of polluted water and learn how to clear it by filtration. A simplified version of water treatment steps is provided, in preparation for a possible class visit to a local municipal water plant. They examine and practice ways of water conservation appropriate to their age and situation.

In conclusion, based on their findings and experiences, children compile a class newspaper on water conservation to read at school and proudly show at home.


RAIN

WATER IS YOUR BEST FRIEND

PART III

TAKE CARE OF YOUR FRIEND WATER

LESSON 1 — How Is Water Collected and Saved For Us?

Key Idea: Water is collected and stored by natural and built systems.

Activity: How does the ground collect and store water?

Materials:

Plastic pot full of soil

Five small plastic glasses

Quart of water

Tray to catch excess water

Funnel

Kitchen scale

Procedure: To show how soil holds water like a sponge, weigh the pot of soil and record the weight on the board. Place the pot on the tray. Fill the plastic glasses with water and select five children to "rain" on the pot. Ask: What is the water doing? Where is it going? Will the pot weigh the same or differently? More or less? Re-weigh the pot and compare the figures. Pour excess water not absorbed by the soil back into the quart container. Did we get all the "rain" back? If not, where did we lose some? Why is soil something like a sponge when it rains? When it rains, which will store the most water, the paved streets, sidewalks, packed playground, garden soil, woods soil? How could plants help us hang onto rain? Which part of the plants hold back the most water? (roots) Why can soil be called a kind of water "bank"?

Water is Your Best Friend, Part III

Activity: How is run-off water collected?

Materials: Two quarts or gallons of water

Two small watering cans with fine spray heads

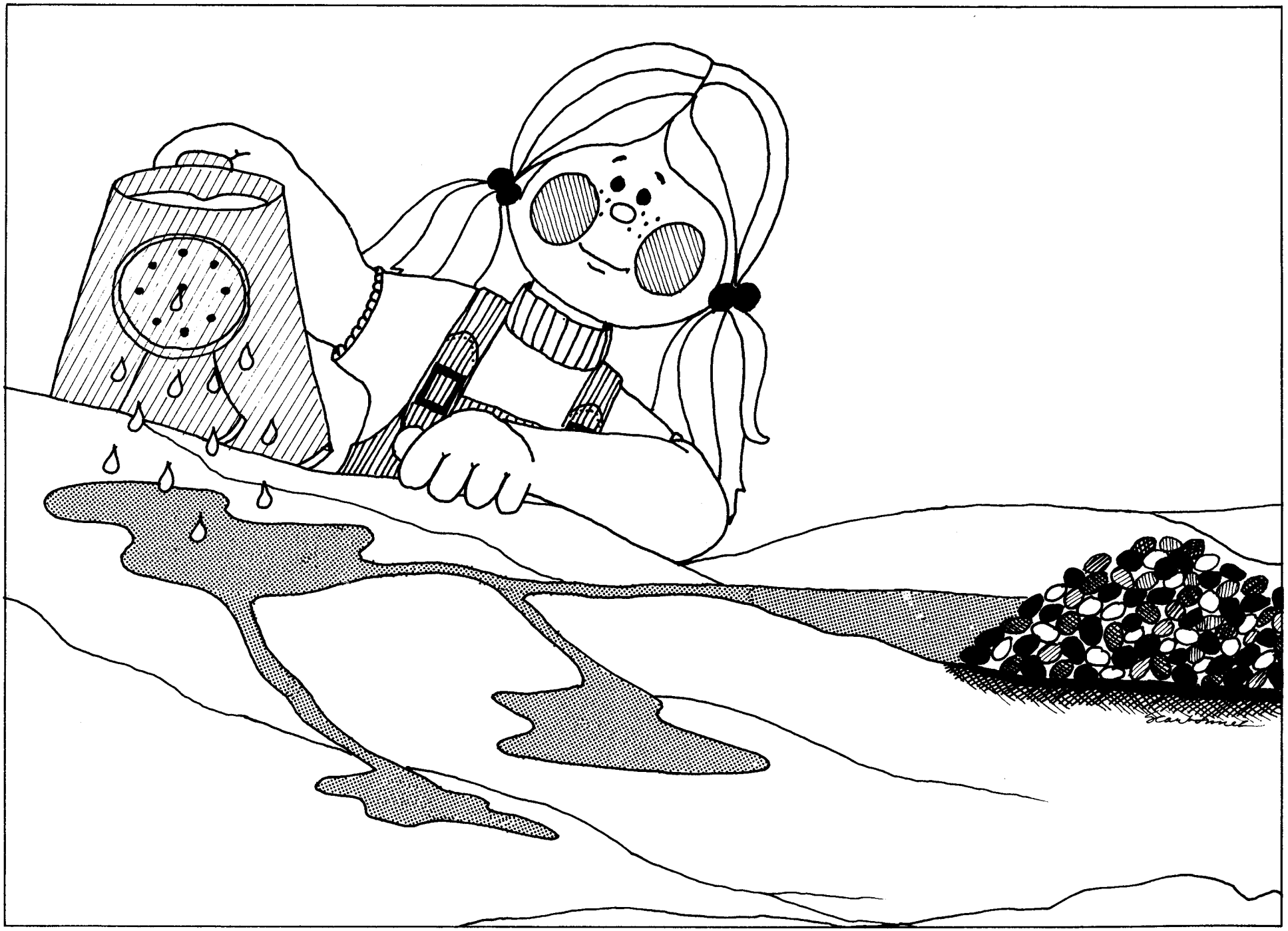
A collection of small pebbles or hard play dough balls

Sandbox or uneven school yard area, 3 feet square

Procedure 2: Take the class with materials to selected area. Enroute children may collect more pebbles. Explain: imagine that this area is a miniature model of some place on earth with high and low spots, mountains and valleys. Which spots could be our mountains, which the valleys? Then, have two children fill the watering cans and "rain" on the area until the can or one container of water is used up. What is happening to our rain? How much of it ran off? How much soaked in? To make more soak in, help children select small wrinkles or folds in the surface where low rows of pebbles can be piled across to form small catch basins. Again, try "raining" with the second container and note less runoff and water loss. This simple method has been used for centuries by people living in lands of very little rain (parts of the Sinai desert receive less than two inches a year yet the inhabitants raise crops on terraces built across the smallest crease in the ground).

In California people build high dams across streams and rivers to catch and store water in huge reservoirs. Children can describe dams or reservoirs they and their families have visited.

To encourage water storage at home, you may wish to duplicate the following letter to parents for each child to take home.



Take Care of Your Friend Water, Part III

Dear Parents,

To assist us in our understanding of water collection and storage, would you please help your child select a small area in your yard or a nearby park where he or she can build pebble catch basins. One or more low rows of small pebbles should be placed across small folds or creases in an area with a gradual slope. This will slow down running water and help it soak in before being lost down the drains.

Now may be a fine time to share some gardening duties. Your child will enjoy learning how to tell when plants are thirsty, the right time of day to water, and how to save and store rain water for the garden.

Thank you,

_____

Teacher of water collectors

Water is Your Best Friend, Part III

LESSON 2 How Is Water Shared?

Key Idea: Water comes to you from rivers, lakes, storage reservoirs or underground wells through a system of aqueducts, canals and pipes.

Activity: How does your water come to your home and school?

Materials: Map of California water system

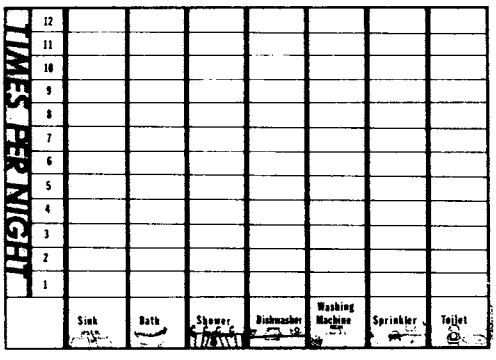
In front of children, use markers or crayons to color:

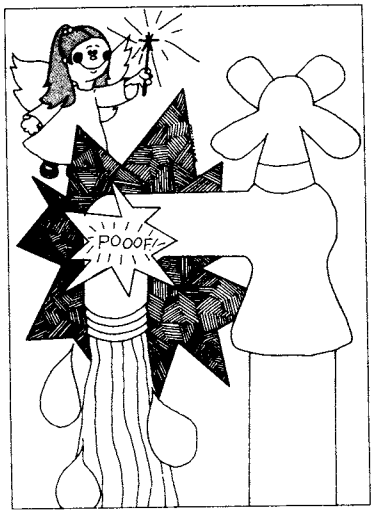
lakes and rivers--blue

reservoirs--red

canals and aqueducts--green

Procedure: How does water from so far away reach your home or school? Does a magic fairy put it there? Using the map, explain: This is a map of California's water storage system. The blue areas are natural lakes and the blue lines are rivers. Which can you locate? The red spots are reservoirs built to collect and store water for us. Who can find them? How many can you find? Which one is nearest us? If you remember the celery's pipe system (Part I, Lesson 2) you can tell us how we get water from a reservoir. Some of the bigger "pipes" which carry water to farms and large cities are called canals or aqueducts (green lines). Who can find a canal on the map? An aqueduct? Who can find the town or city nearest our school? Who can trace the path of water from the nearest reservoir to our school? Some people and places get their water from underground wells but these are too small to show on our map of the state.





Water is Your Best Friend, Part III

Extension: What is our school water system?

Materials: Sample bar graph for school and home use

Procedure: If possible, the principal and/or custodian might visit the class to describe the school water system. Children will want to know how much water the school uses in a day, a week, a month, what it costs and where the water comes from (main supply). Discuss with children ways of using less water at school: for instance, catching runover drinking fountain water for classroom plants. Make a class bar graph showing use of different school water outlets. Each time a child uses a different outlet, he/she colors a square of the graph. After a week discuss the class graph. Ask: which outlets are used most? Least? Which use the most water? Least? Where is water wasted? How can we save some? (e.g., home shower water can be caught and used to fill toilet tank)

You may wish to duplicate the bar graph for home water "detective" recording.

LESSON 3 How Can You Save Water?

Key Idea: Since there is only so much water to go around, we must learn and practice ways to save, reclaim, and reuse it.

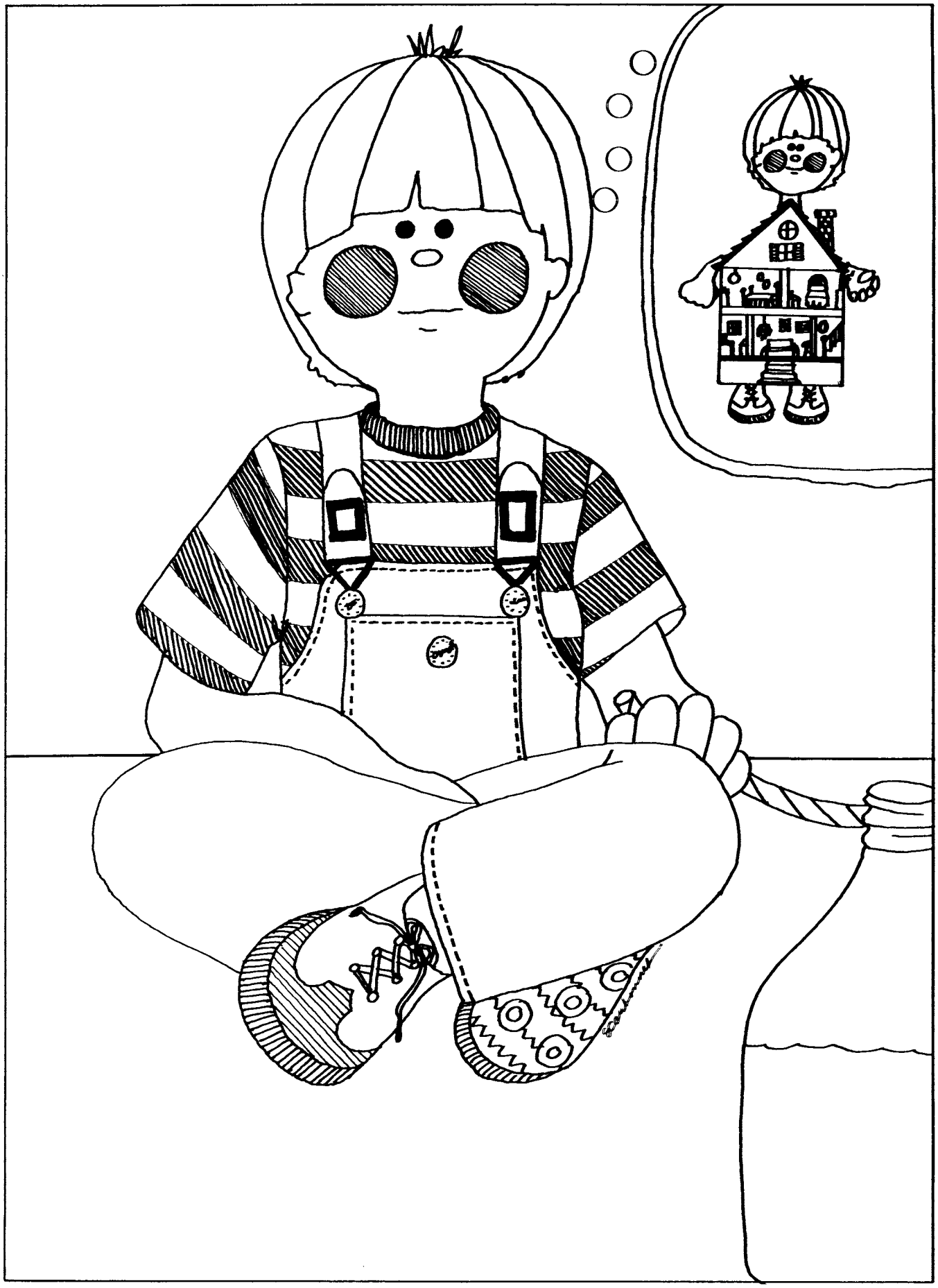
Activity: What are some ways to save water at home and school?

Materials: A gallon jug of water

A 5 foot piece of yarn or string for each child

Drawing paper for each child

Procedure: As children sit in a circle on the floor, explain: We are going to pretend each of us is a house with people inside. Can you imagine your people, their pets and their home. How many people are inside you? How many rooms? Which rooms have water outlets? What kind? Pretend this gallon jug is our town reservoir--our whole year's water supply. With the container at the



Water is Your Best Friend, Part III

Procedure: (continued)

center of the circle, run a piece of yarn from the container to each child. Imagine that these pieces of yarn are water pipes to your house. Imagine the different outlets in your "house." Which one might use the most water? (toilet) Which outlet is most apt to waste it? What if someone in your house wastes water? (At year's end your house might run out of water.)

With children's help make a chalkboard list of all the ways you use and save water in your "house." Here are a few "starter" ideas:

Toothbrushing: Use water only to wet the brush and for rinsing.

Bathing: use timer for short shower.

Toilet: Flush only as required (place one quart plastic bottle in tank to displace water).

Tub bath: Use water only as deep as needed.

Leaky faucet: Tighten fittings; replace washer.

Hand laundry: Fill sink or tub only as far as necessary for rinsing (don't use running water).

Car washing: Use bucket and sponge; hose only to rinse.

Yard: Don't water in the heat of the day (decrease evaporation).

From the board list have children choose a water saving idea for a water poster to take home. Some children may choose a school water saving idea for a poster, e.g., one over the sink or drinking fountain.

Extension 1: Who wastes water? Who saves it?

Procedure: After discussing ways to save water, pair up children to act out a water use. One partner is to show water <u>saving</u>, the other water <u>wasting</u>. The class tries to guess which is which.

Extension 2: How can you be a water "detective"?

Water is Your Best Friend, Part III

Procedure: Encourage children to find water leaks at school and at home. For example, a few drops of food coloring in the toilet tank will show up in the bowl if the toilet is leaky. Water "detectives" can listen and look for dripping faucets. Collect and measure the water loss overnight and report to adults.

Activity: How can we reclaim and reuse water?

Materials: Read aloud: "Let's Stop Water Pollution" by Michael Chester, 1969, Putnam, or similar picture-story book.

Procedure: If available, books on water treatment and pollution could create readiness for the valuable experience of visiting a local water treatment plant. Explain: water treatment may involve local water purification and/or water recycling for reuse in lawn watering, play fields, parks, golf courses, and industry.

Water coming into home and school must be purified. People responsible for our water supplies are constantly checking to be sure it is not contaminated before it reaches us.

Water going out of school and home drains may be reused after less treatment for non-human consumption.

In either case, the first step is clearing the water of some pollution by filtering. Ask: What is pollution? How did we pollute water we used for painting when we cleaned our brushes? How else do we pollute water at school and home? (by washing, bathing, using the toilet)

When you and your family have gone swimming or picnicking beside a stream or lake, what kind of water pollution have you seen? (empty cans, trash, picnic wastes, leftover food, etc.) If you have ever been in a boat or on a ship, have you seen people pollute the water by dumping or dropping things overboard?

Extension: How could we filter some good water polluted with paint or mud or "junk"?

Materials: Quart of water

Empty quart jar

Medium or large funnel

$\frac{1}{2}$ cup sand

Wad of cotton (absorbent)

Water is Your Best Friend, Part III

Procedure: After children have mixed paint or mud in the quart of water to pollute it, they can filter and clear it as follows:
Place a wad of cotton in the bottom of the funnel. Cover the cotton with an inch of sand. Set the funnel in the empty jar and gently pour in the "dirty" water. Filtering is the first step to cleaning water for reuse.

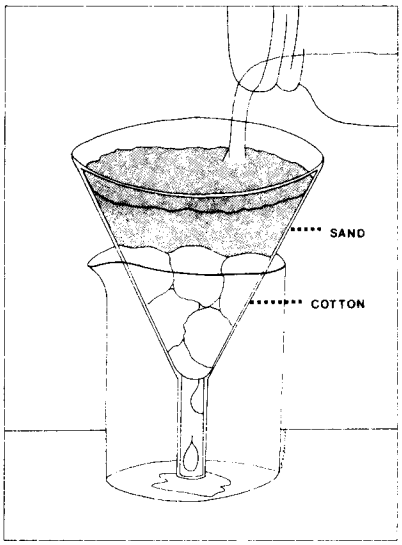
Background Information

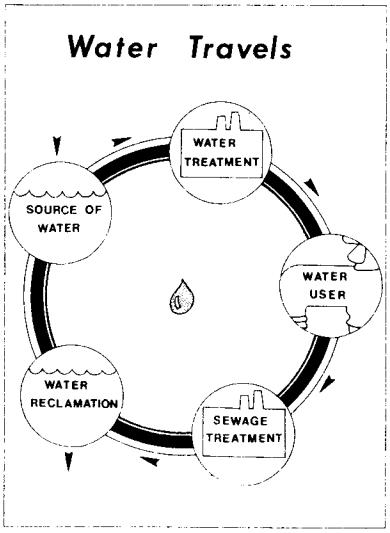
Sewage Treatment Plant

In a sewage treatment plant dirty (polluted) water may also go through the following steps: In the primary settling tank, some floating material and most heavier solids are removed. Next the water goes to the aeration tank where it is sprayed into the air to remove tiny invisible organisms and toxic gases. Next carbon filters remove pollutants such as pesticides. The now clear water moves to a chamber containing chlorine gas (children will recall the strong odor and cautions when household Chlorox is used). Even after all these steps, water is considered ready for reuse but not for drinking. Its uses are limited to those that will not result in human consumption--such as watering golf courses.

So What? All the fresh water earth has now, it has always had. Earth gets no new supplies from space, as the astronauts saw on the Moon. (dry, dry, dry!) Spaceships and our Earth "ship" which are sealed off from space are called "closed systems"--Recycling is vital in closed systems. All life must have water.

TO CONSERVE WATER TO HAVE ENOUGH FOR EVERYBODY, WE HAVE TO HELP THE WATER CYCLE BY RE-USING WATER--BY TAKING BETTER CARE OF THE WATER WE HAVE.





★★ WHAT IS WATER? ★★

A newspaper edited and published by the students of room A-5 MARCH 1982

We eat water

Peter

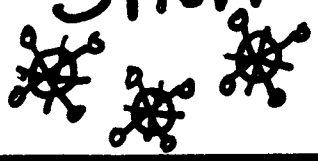
Water goes in a circle

by. Sam

rain

gas

Snow



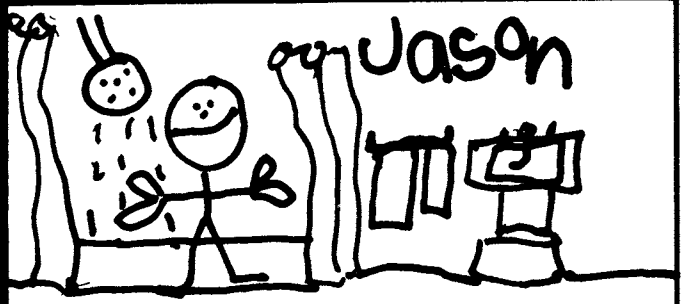
Tommy

Our old water waters parks

by Jenny

We Swim

Tracy C.



Jason

I take a 4 minute shower

Water is Your Best Friend, Part III

Activity: How can we make our friends and family more careful of our friend WATER, and teach them how to save it?

Materials: a $2\frac{1}{2}$ x 4 inch piece of paper for each child

Four sheets of duplicating paper

Parent letter

Procedure: Ask children to try to remember all the things they have learned about water. Help them by listing the following board headings: Water's Three Forms; Uses of Water; and Ways to Save Water. Discuss each and add children's ideas under the headings. When all are listed, suggest that since they have learned that water conservation is so important, they write a newspaper to share their ideas. Let the class select a title for the paper. Have each child select an idea to illustrate or to write about on the small sheets.

To assemble the newspaper, paste the completed articles on the full sheet of paper for duplication. To save paper, duplicate on both sides, as in a standard newssheet.

For household saving hints that children may not have included, you may wish to duplicate the enclosed letter to go home with the "newspaper."

So What? To conserve water to have enough for everybody, we must help the water cycle by taking better care of the good water we have in our state.

Hone/Thompson

Take Care of Your Friend Water, Part III

Dear Parents,

We have just completed our study of water awareness, use and conservation. Attached is a copy of our own Water Newspaper. We think you'll enjoy it. While our study has culminated for now, we hope you will continue to be aware of your water usage and water conservation at home. Here are some ways other people have found to save water:

Toothbrushing/Shaving: Use water only to wet the brush and for rinsing.

Bathing: Use kitchen timer to limit showers to 4-5 minutes; mark a line inside tube to limit depth of water.

Toilet: Flush only as required; check for leaks.

Leaky faucets: Measure overnight water loss; tighten fixtures; replace washers.

Laundry or Dishes: Wait for a full load before use.

Car washing: Use bucket and sponge; hose only to rinse.

Hand laundry: Use tub water for rinsing.

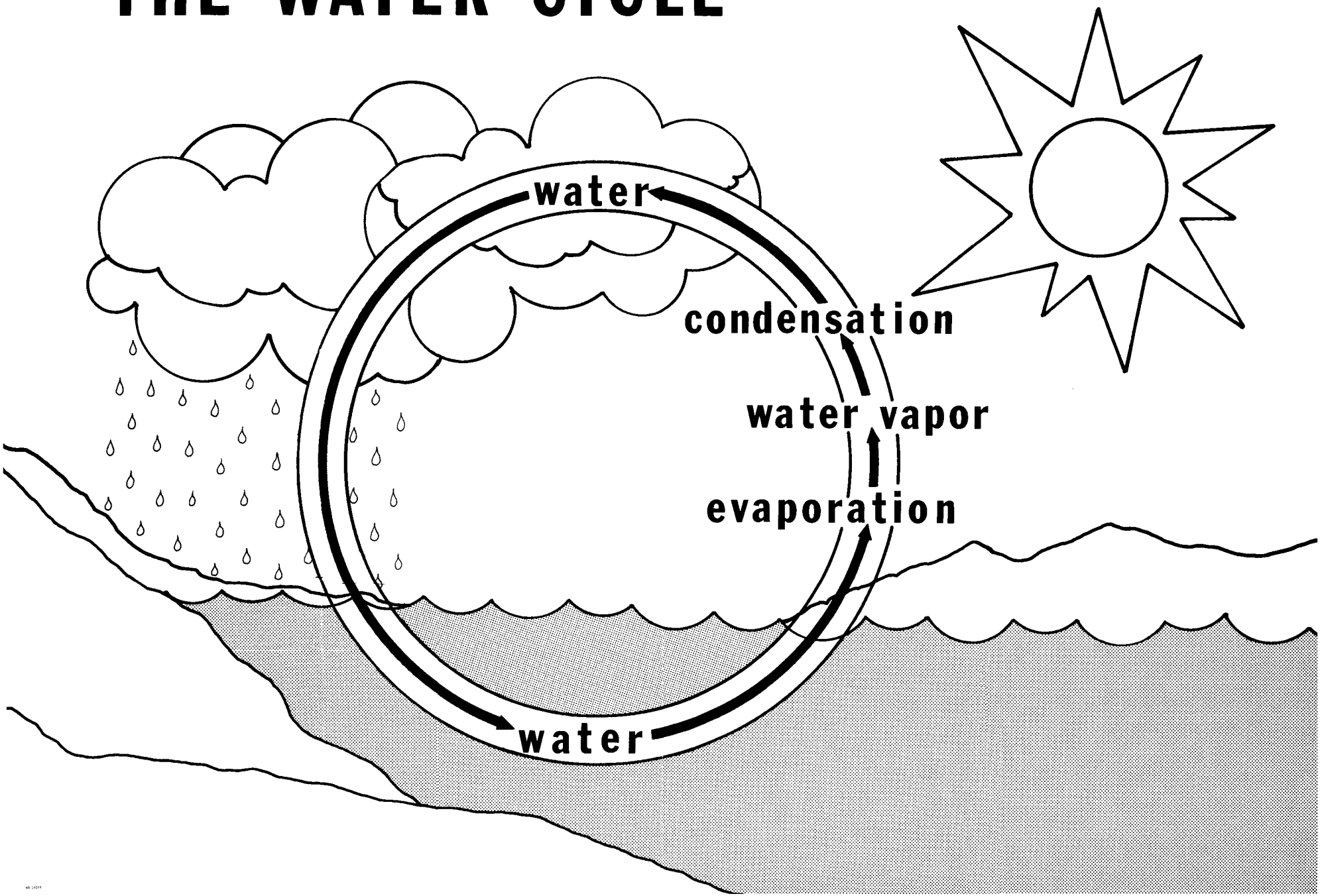
Yard and Garden: Water only as needed; early A.M. for least evaporation.

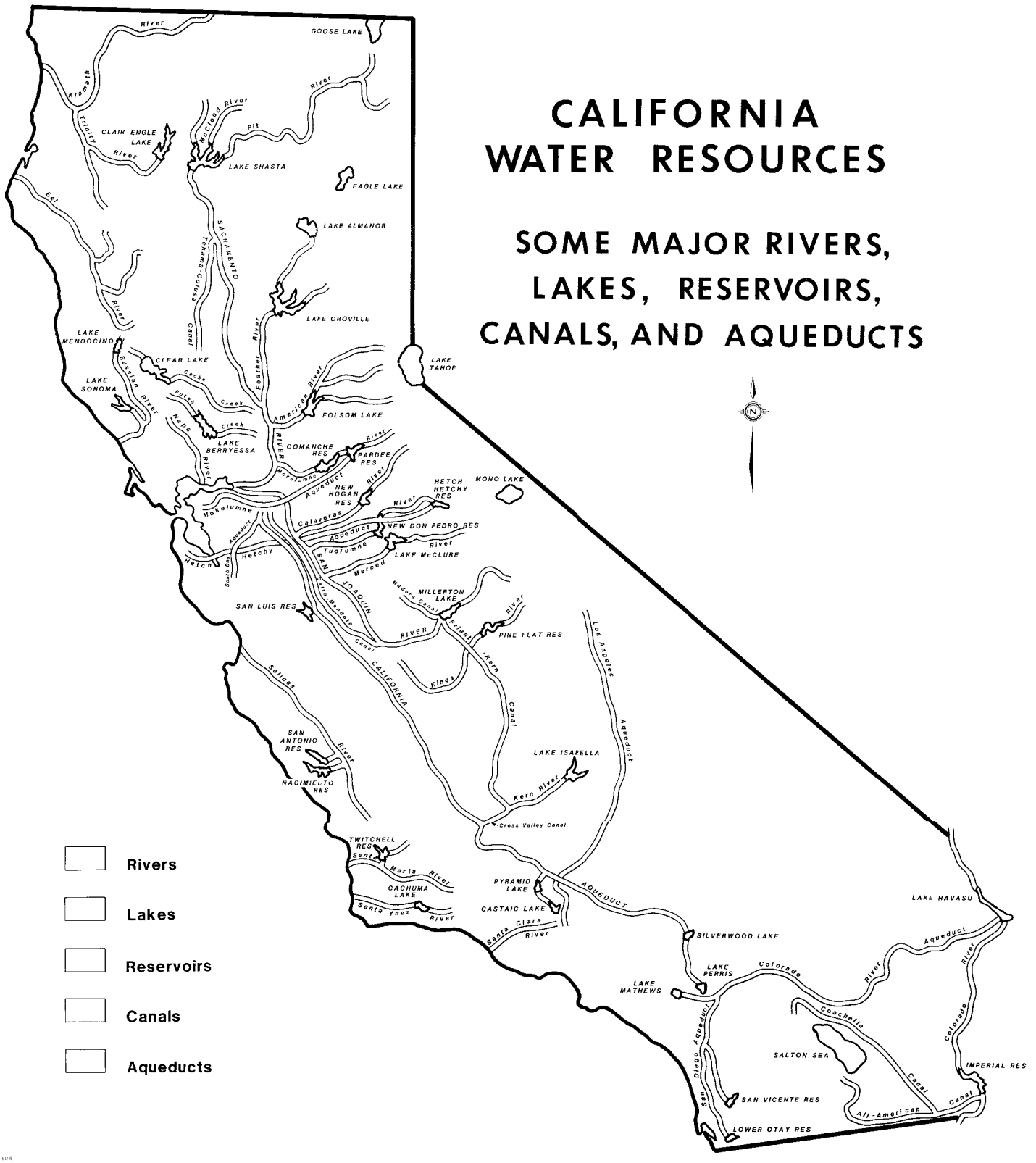
Thank you for helping to make our water study more meaningful.

_____

A Teacher of Water Savers

THE WATER CYCLE




CALIFORNIA
WATER RESOURCES
SOME MAJOR RIVERS,
LAKES, RESERVOIRS,
CANALS, AND AQUEDUCTS
Rivers
Lakes
Reservoirs
Canals
Aqueducts
GOOSE LAKE
Klamath River
Trinity River
CLAIR ENGLE LAKE
McCloud River
Pit River
LAKE SHASTA
EAGLE LAKE
Eel River
LAKE ALMANOR
Tehama-Colusa Canal
SACRAMENTO RIVER
LAKE OROVILLE
LAKE MENDOCINO
Russian River
CLEAR LAKE
Cache Creek
Putah Creek
LAKE SONOMA
Napa River
LAKE BERRYESSA
Feather River
American River
FOLSOM LAKE
LAKE TAHOE
COMANCHE RES
PARDEE RES
Mokelumne River
NEW HOGAN RES
HETCH HETCHY RES
MONO LAKE
Mokelumne Aqueduct
Calaveras River
NEW DON PEDRO RES
Tuolumne River
LAKE McCLURE
Hetch Hetchy Aqueduct
South Bay Aqueduct
SAN JOAQUIN RIVER
Delta-Mendota Canal
Madera Canal
MILLERTON LAKE
Fresno River
PINE FLAT RES
SAN LUIS RES
Salinas River
CALIFORNIA Aqueduct
Kings River
Kern Canal
Los Angeles Aqueduct
SAN ANTONIO RES
NACIMIENTO RES
LAKE ISABELLA
Kern River
Cross Valley Canal
TWITCHELL RES
Santa Maria River
CACHUMA LAKE
Santa Ynez River
PYRAMID LAKE
CASTAIC LAKE
AQUEDUCT
Santa Clara River
SILVERWOOD LAKE
LAKE HAVASU
Colorado River Aqueduct
LAKE PERRIS
LAKE MATHEWS
Coachella Canal
SALTON SEA
IMPERIAL RES
San Diego Aqueduct
SAN VICENTE RES
All-American Canal
LOWER OTAY RES