WATER OLYMPICS

I. Topic Area

Properties of water

II. Introductory Statement

This is a series of four activities that deal with some of the properties of water. The activities are short and may be done one at a time or all together in an "Olympic" format. The activities can be used as an introduction to a water unit with the students discovering some of the properties of water, or they can be used as culminating activities. Either way, it is important that the children discuss the properties of water they have observed after doing the activities.

III.

Math Skills	Science Processes
a. Computation	a. Observing
b. Measuring	b. Predicting
	c. Collecting and recording data
	d. Controlling variables

IV. Materials

Amazing Water Race:
roll of wax paper, copies of water maze, tape, eyedropper, toothpicks, liquid soap

Fold and Float:
aluminum foil cut in five inch squares, bowls for water

Paper Towel Absorption:
three different brands of paper towels, rulers, bowls or cups for water

Bubble Rings:
liquid soap, straws, centimeter rulers, cups

V. Key Question

See task cards for each activity.

VI. Background Information

Amazing Water Race: Water molecules are attracted to each other because of their molecular structure. This attraction of like molecules is called cohesion. This causes water molecules to want to stay together unless the cohesive bonds are weakened. Soap weakens the strong bonds between water molecules.

Fold and Float: Aluminum should sink when placed in water because it has a density which is greater than that of water. However, when a piece of aluminum foil is placed flat on the surface of water, it will often float. This is because the surface tension of water is strong enough to hold up the aluminum foil even though it is 2.7 times denser than water. Surface tension is caused by the cohesion between water molecules. The molecules below the surface of the water are attracted equally in all directions, while those on the surface are only attracted to the sides and downward. This causes the surface of the water to contract and act like it is covered with a thin film. The surface tension of water is strong enough to hold up some objects that are more dense than water. This is why some insects, like the water strider, are able to walk on the surface of water.

Paper Towel Absorption: Water is able to travel through the narrow spaces between the fibers of paper towels by capillary action. The attractive force between the water molecules and the paper fibers is greater than the cohesive force between the water molecules. This causes the water molecules to be pulled up the paper towel against the force of gravity. The attraction between unlike molecules is called adhesion.

Bubble Rings: See the background information in the "Bubble Busters" activity in this book.

VII. ManagementSuggestions

These four activities may be done as individual lessons or as centers in an "olympic" format with students rotating through the activities. The task cards can be run off and placed at each center. Students should be responsible for cleaning up a center before moving on to the next one. An extra supply of paper towels may be placed at each center to facilitate clean up. It is important that these activities be followed by class discussions which focus on the water properties involved.

VIII. Procedure

The procedures for each activity are given on the task cards but some students may need each activity demonstrated before starting. The task cards may be run off and placed at each center. If the students are doing the activities as part of a water Olympics, they will each need a copy of the score card. The students must make a prediction and record it on the score card before doing each event. The person with the lowest score is the winner.

The following are special instructions for the four events.

Amazing Water Race: Tape a piece of wax paper over each maze before starting. After doing the two activities for this event you may want to have students observe the effect of soap on the cohesion of water by dipping a toothpick into liquid soap and then touching a large water drop with it. Make sure that you have fresh water, toothpicks and wax paper if you repeat this activity or the soap left on the maze or toothpick will spoil the results for the next group.

Fold and Float: This activity could be extended with older students to cover fractions. Each time you fold the foil in half you are decreasing its area by a power of two. After three folds you have only one eighth of the original surface area, after four folds you have only one sixteenth.

paper Towel Absorption: The paper towels can be cut beforehand into strips. The school's paper towel can be used as one of the three brands tested for absorption rate. The students can tape the three strips to a pencil so they can dip them simultaneously into the bowl of water.

Bubble Rings: Mix the bubble solution beforehand by adding 30 ml (2 tablespoons) of liquid soap to the water in a two liter plastic bottle. Place 4-6 cups of bubble solution on the table along with a box of straws. The students will each get their own straw when blowing bubbles and then will use centimeter rulers to measure the diameter of the ring that is left on the table when the bubble bursts.

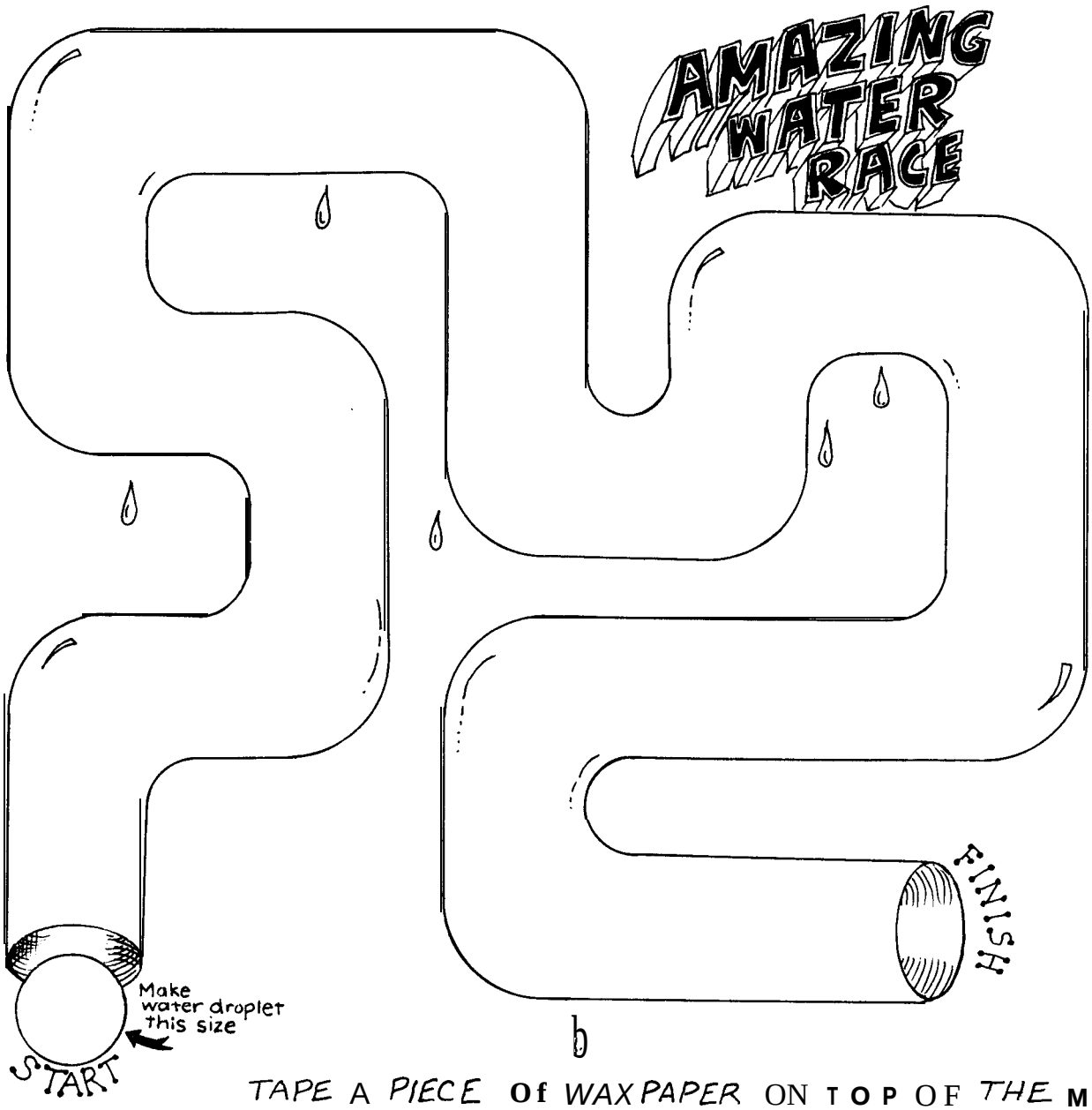
IX. Discussion Question

The discussion should center on the properties of water that the students observed at each center. See the background information for a description of the water properties for each activity.

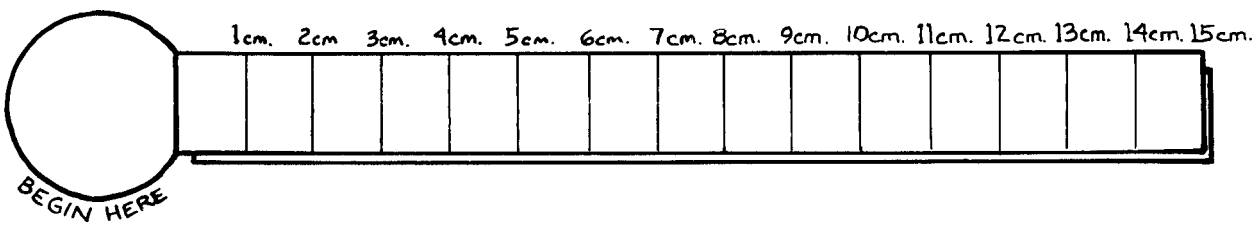
WATER OLYMPICS

EVENT:	PREDICTION:	ACTUAL:	DIFFERENCE:
A-MAZING H_2O RACE	_____ sec.	_____ sec.	_____
(1) H_2O STRETCH	_____ cm	_____ cm	_____
(2) FOLD 'N FLOAT	_____ folds	_____ folds	_____
(3) PAPER TOWEL ABSORPTION (0 if correct — 5 pts. if wrong)	PAPER TOWEL #_____	PAPER TOWEL #_____	RIGHT 0 OR WRONG 5
(4) BUBBLE RINGS	_____ cm	_____ cm	_____
		TOTAL DIFFERENCES	_____

* REMEMBER to subtract the lower number from the higher number.
* Keep your difference as low as possible.



TAPE A PIECE Of WAX PAPER ON TOP OF THE MAZE.



WATER STRETCH

Fold 'n Float

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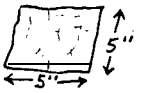
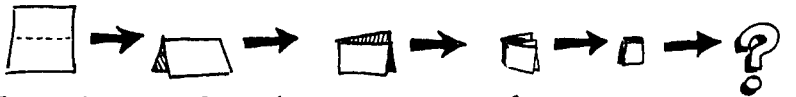
- **QUESTION:** HOW MANY TIMES CAN YOU FOLD A 5"x5" PIECE OF ALUMINUM FOIL UNTIL IT SINKS? HOW SMALL CAN YOU GO?

- **THINGS YOU NEED:** 1 BOWL (⅔'s full of H_2O), 1 5"x5" piece of aluminum foil



1. FLOAT THE 5"x5" FOIL IN THE WATER.
2. PREDICT THE NUMBER OF FOLDS THAT CAUSE THE FOIL TO SINK.
3. FOLD IT IN HALF - (THAT'S YOUR 1ST FOLD) - PLACE IT IN THE WATER. DOES IT FLOAT?



4. If SO... FOLD IT IN HALF AGAIN - (THAT'S YOUR 2nd FOLD) - DOES IT FLOAT?
5. KEEP FOLDING THE FOIL IN HALF AND TESTING WHETHER OR NOT IT FLOATS AFTER EACH FOLD.
6. KEEP MAKING THE "SURFACE AREA" OF THE FOIL SMALLER UNTIL IT SINKS.

A-MAZING

EVENT: ·H_2O·RACE·

'87 MAX CANTU

QUESTION: How can your water drop be guided through the maze?

PROCEDURE:

① TAPE A PIECE OF WAX PAPER ON TOP OF THE MAZE.

② PLACE A WATER DROP TO FIT INSIDE THE CIRCLE ON YOUR PAPER.

③ MOVE THE WATER DROP THROUGH THE MAZE WITH A TOOTHPICK. IF THE DROP SEPARATES, GO BACK AND COLLECT IT BEFORE YOU CONTINUE.

④ TIME HOW LONG IT TAKES TO MOVE THE DROP THROUGH THE MAZE.

QUESTION #2: PREDICT - HOW FAR CAN YOU STRETCH THE DROP OF WATER * FIND THE DIFFERENCE BETWEEN THE PREDICTION AND THE ACTUAL LENGTH.

EVENT:

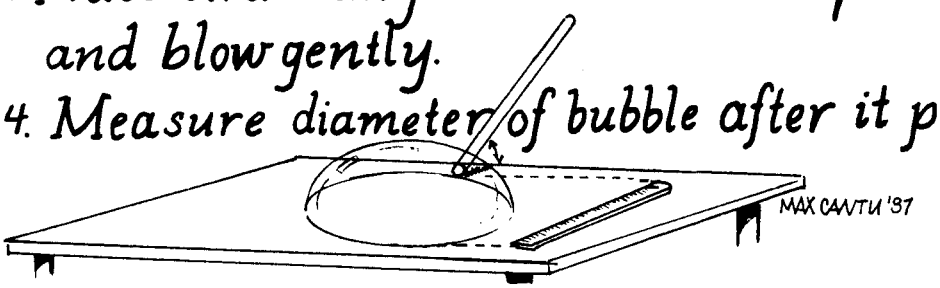
Bubble Rings

Question: *How large a bubble can you blow?*

You need: *1 straw per person, bubble solution, 1 cm. ruler*

Procedure:

1. *Wet table top or paper plate surface.*
2. *Trap bubble solution into straw.*
3. *Place straw angled on the tabletop and blow gently.*
4. *Measure diameter of bubble after it pops.*



EVENT:

PAPER TOWEL ABSORPTION

PAPER TOWEL RACE

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- 0 POINTS IF YOUR PREDICTION IS CORRECT
- 5 POINTS IF YOUR PREDICTION IS WRONG. ☺

QUESTION: WHICH BRAND OF PAPER TOWELS ABSORBS THE WATER THE FASTEST?

MATERIALS: 1 STRIP - 1" x 8" - OF EACH BRAND OF PAPER TOWEL PER GROUP
1 BOWL OF WATER

PROCEDURE: PREDICT WHICH BRAND IS THE **FASTEST** TO ABSORB H_2O.

- MARK EACH STRIP AT THE 18 cm MARK.
- PLACE 1 STRIP FROM EACH OF THE TEST STRIPS INTO A BOWL OF H_2O ALL AT THE SAME TIME.
- THE WATER REACHES THE 18 cm MARK ON WHICH STRIP FIRST?
- COMPARE THE PREDICTION WITH THE ACTUAL RESULTS. IF YOUR PREDICTION WAS THE FASTEST THE DIFFERENCE IS 0; IF NOT, GIVE YOURSELF 5 POINTS IN THE DIFFERENCE COLUMN.