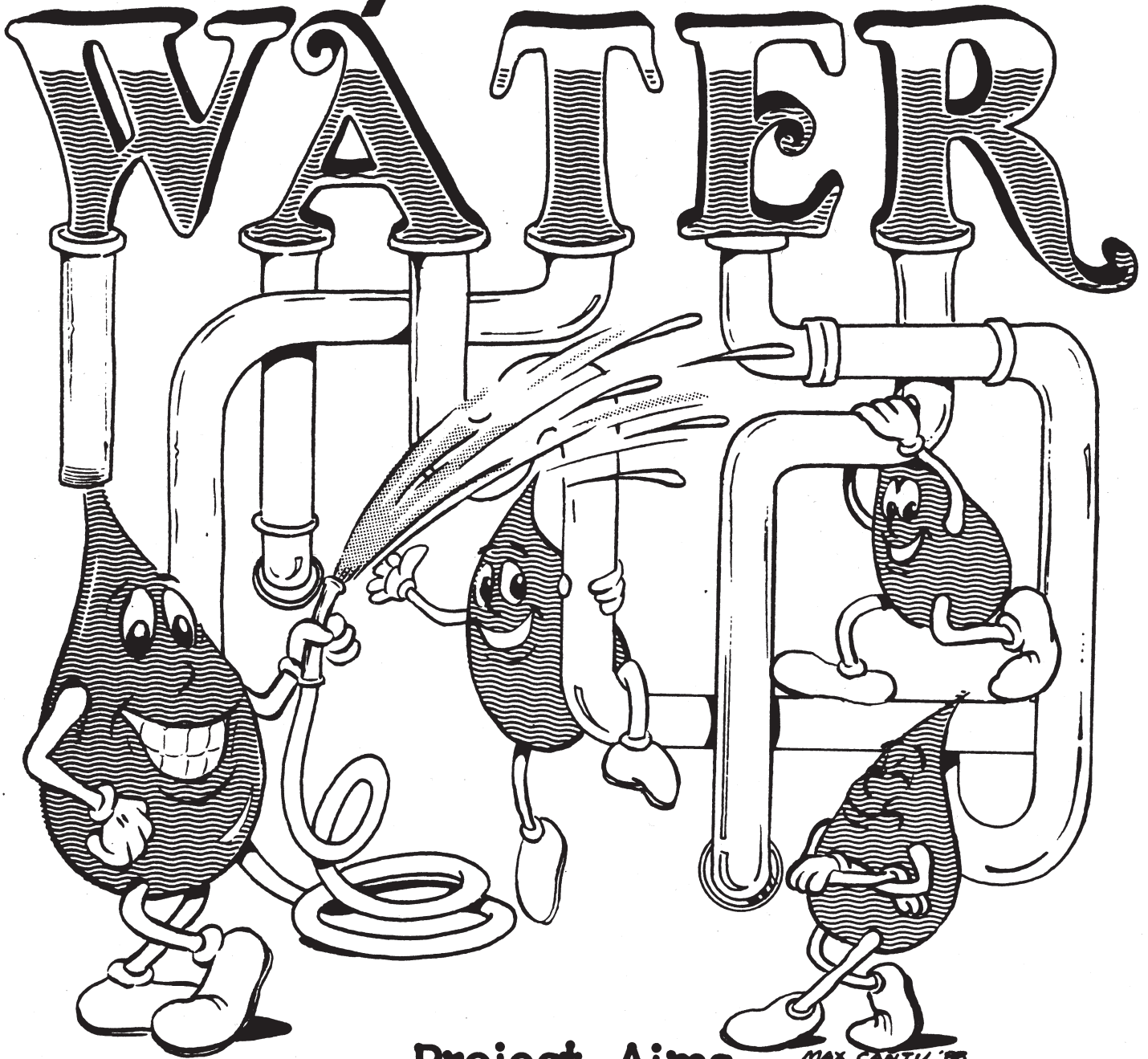


WATER

precious



Project Aims

MAX CANTU '88

**A Collection of Elementary Water Activities
Book A**

WATER FACTS

I. Topic Area

Water facts

II. Introductory Statement

Students will participate in a cooperative learning lesson in which they will be exposed to a variety of interesting facts about water.

IV. Materials

32 question cards
1 answer sheet per group

VII. Management Suggestions

1. Prepare the question cards ahead of time. They should be cut apart and glued to construction paper or tag board. They can be colored and laminated for future use.
2. Put class in groups of 4 students. Each group needs a passer and a recorder.
3. Discuss the social skills necessary for reaching a group decision. Encourage all group members to participate. Discuss acceptable ways to disagree with someone's answer.
4. Be sure the recorder is aware that each card has a number. The group's answer needs to be written on the correct number line.
5. Set up a system to pass the 4 cards on to the next group. Select a passer from each group to pass the cards.
6. Caution students not to mark on the cards.
7. These cards are designed to stimulate thinking and discussion. The logic used in discussing an answer is perhaps more important than the answer itself.

VIII. Procedure

1. Divide the class into 8 groups, be sure they are heterogeneously mixed.
2. Have each group select a recorder. The recorder will write down the answers to the true/false questions. The recorder should number the answer sheet from 1 to 32.
3. Tell the class that they are going to be given 32 true/false statements. They are to discuss the questions and arrive at a group answer. The recorder will write down that answer. Emphasize that they may not know the correct answer for each question, but that they are to share ideas and come up with a group answer.
4. Each group will begin with 4 question cards. The group will have a few minutes to finish each set of 4 cards. The teacher should let each group know when time is up, and they will pass their set of cards to the next group. Keep the same rotation each time. The groups will pass the cards 8 times, until each group has had all 32 questions.
5. Refer to the key and read the answers and the explanatory statements. Discuss the answers with the students. Accept answers that have a logical base even if it differs from the key. See * on key.

IX. Discussion Questions

1. Which of the cards had answers that were surprising to you?
2. What are some ways we can conserve water?
3. Tell a partner 4 things you learned from the activity. Reverse the roles and repeat.

X. Extended Activities

1. Choose a card and make a water conservation poster.
2. Do some research on water and make up 4 fact cards of your own.
3. Devise activities that demonstrate some of the facts learned.

WATER FACTS

Answer Key


1. False* — at sea level water boils at 212°F. The boiling point of water decreases as air pressure decreases. High in the mountains water will boil at a lower temperature.
2. True — steam is invisible. The vapor seen is condensed water. Steam would be the invisible portion of the air between the tea kettle and the vapor cloud.
3. True or false — books list the percentage anywhere from 60% to 90%.
4. True — H₂O - However it is very rare to find a single water molecule.
5. False — 15–30 gallons are used.
6. True
7. True
8. False — 97% is in the salty oceans.
9. True
10. False — 40% is used.
11. True
12. True
13. False — 70 gallons per day.
14. True
15. False — 32°F or 0°C.
16. True
17. False — water itself is not a good conductor. When a person is wet the person loses his resistance and becomes a good conductor.
18. False — it expands - it is rare for a substance to expand when frozen.
19. False — due to surface tension, many insects can.
20. True
21. False — due to surface tension, a free falling drop is round.
22. True* — if you leave the hose running.
23. True
24. False — water is denser than oil, and an equal volume is heavier.
25. False — it takes 100,000 gallons to manufacture a car.
26. True — hydrogen and oxygen - H₂O.
27. True — in capillary action in plants, water molecules are attracted to one another and are pulled up to the top of the plant.
28. True
29. False — much of the water will evaporate and the water will not reach the plant's roots.
30. True — this is why you add salt to water when boiling pasta.
31. True
32. True* — however this depends on the temperature of the environment.

*Accept answers, true or false, if the answer is based on some logical explanation.

WATER FACT CARDS

1


WATER WILL BOIL
AT 180°F



TRUE OR FALSE

2


STEAM IS
INVISIBLE.



TRUE OR FALSE

3


YOUR BODY IS
ABOUT 75 %
WATER



TRUE OR FALSE

4


ONE OXYGEN ATOM
AND TWO HYDROGEN
ATOMS CAN FORM A
WATER MOLECULE



TRUE OR FALSE

5


TAKING A SHOWER
USES ABOUT 8-10
gallons of
water.



TRUE OR FALSE


6

A person needs
to take in
2½ quarts
of water a
day.



TRUE OR FALSE


7



Water is the only substance
on Earth that is naturally pre-
sent in 3 forms - SOLID, LIQUID, & GAS.


TRUE OR FALSE

8




85% of the water
on Earth is in
the
salty oceans.

TRUE OR FALSE




IT TAKES 10 ⁹
GALLONS OF WATER
TO PRODUCE $\frac{1}{3}$ CAN
OF COLA

TRUE OR FALSE



Every ¹³
AMERICAN
uses 30 gallons
of water a day
in their home.


TRUE OR FALSE



THE TOILET TANK ¹⁰
USES 30% OF YOUR
HOME'S WATER.


TRUE OR FALSE

SNOW ¹⁴
is a form
of
PRECIPITATION




TRUE OR FALSE

WATER IS THE MOST ¹¹
COMMON SUBSTANCE
ON
EARTH.



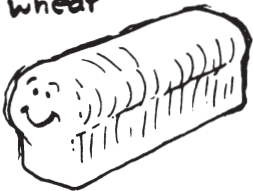
TRUE OR FALSE

BR-R-R!! ¹⁵
WATER WILL
FREEZE AT
32°C.

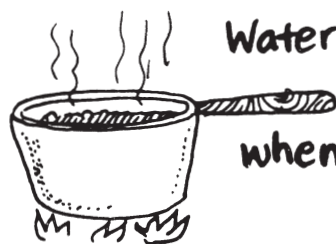


TRUE OR FALSE

It takes 115 gallons of water ¹²
to grow enough wheat
to make a
loaf of BREAD.




TRUE OR FALSE



Water will ¹⁶
expand
when heated.

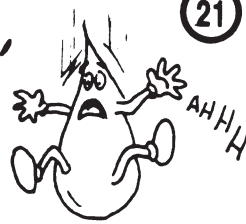
TRUE OR FALSE

WATER IS A GOOD CONDUCTOR OF ELECTRICITY. (17)




TRUE OR FALSE

WHILE FALLING, A DROP OF WATER IS SHAPED LIKE A TEARDROP. (21)




TRUE OR FALSE

WATER CONTRACTS WHEN FROZEN. (18)




TRUE OR FALSE

WASHING A CAR USES ABOUT 100 GALLONS OF WATER. (22)




TRUE OR FALSE

ANIMALS CANNOT WALK ON LIQUID WATER. (19)




TRUE OR FALSE

THE PREFIX "HYDRO" means "WATER." (23)




TRUE OR FALSE

YOUR BRAIN IS $\frac{3}{4}$ WATER. (20)



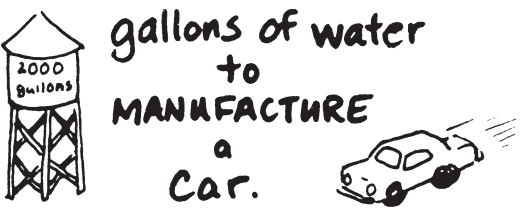
TRUE OR FALSE

A GALLON OF OIL IS HEAVIER THAN A GALLON OF WATER. (24)



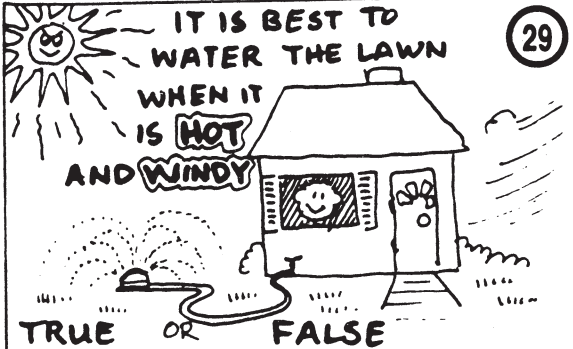
TRUE OR FALSE

IT TAKES 2000 gallons of water to MANUFACTURE a CAR.



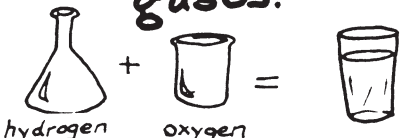
TRUE OR FALSE

IT IS BEST TO WATER THE LAWN WHEN IT IS HOT AND WINDY.




TRUE OR FALSE

WATER IS MADE UP OF TWO COLORLESS AND ODORLESS GASES.



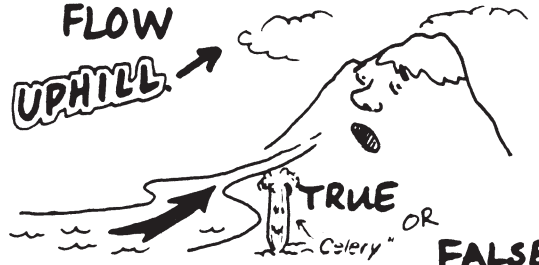
TRUE OR FALSE

Adding Salt to water will cause it to BOIL at a higher TEMPERATURE.



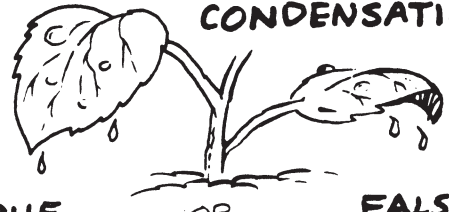
TRUE OR FALSE

WATER CAN FLOW UPHILL.



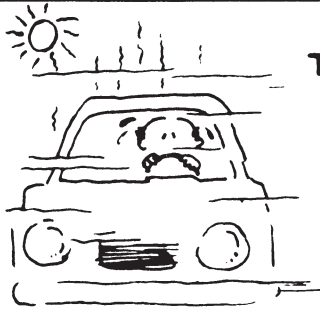
TRUE OR FALSE

DEW IS A FORM OF CONDENSATION.



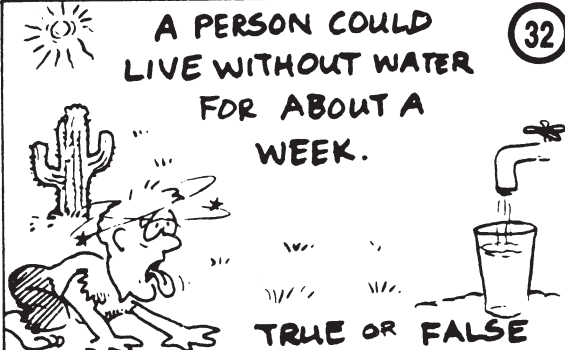
TRUE OR FALSE

THE AMOUNT OF WATER VAPOR IN THE AIR IS CALLED HUMIDITY.



TRUE OR FALSE

A PERSON COULD LIVE WITHOUT WATER FOR ABOUT A WEEK.



TRUE OR FALSE

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

- Computation
- Measuring

Science Processes

- Observing
- Predicting
- Collecting and recording data
- 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. Management Suggestions

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 H₂O RACE	_____ Sec.	_____ Sec.	_____
H₂O STRETCH	_____ cm	_____ cm	_____
FOLD 'N FLOAT	_____ folds	_____ folds	_____
PAPER TOWEL ABSORPTION	PAPER TOWEL # _____	PAPER TOWEL # _____	RIGHT 0 OR WRONG 5
BUBBLE RINGS	_____ cm	_____ cm	_____
TOTAL DIFFERENCES			_____

1

2

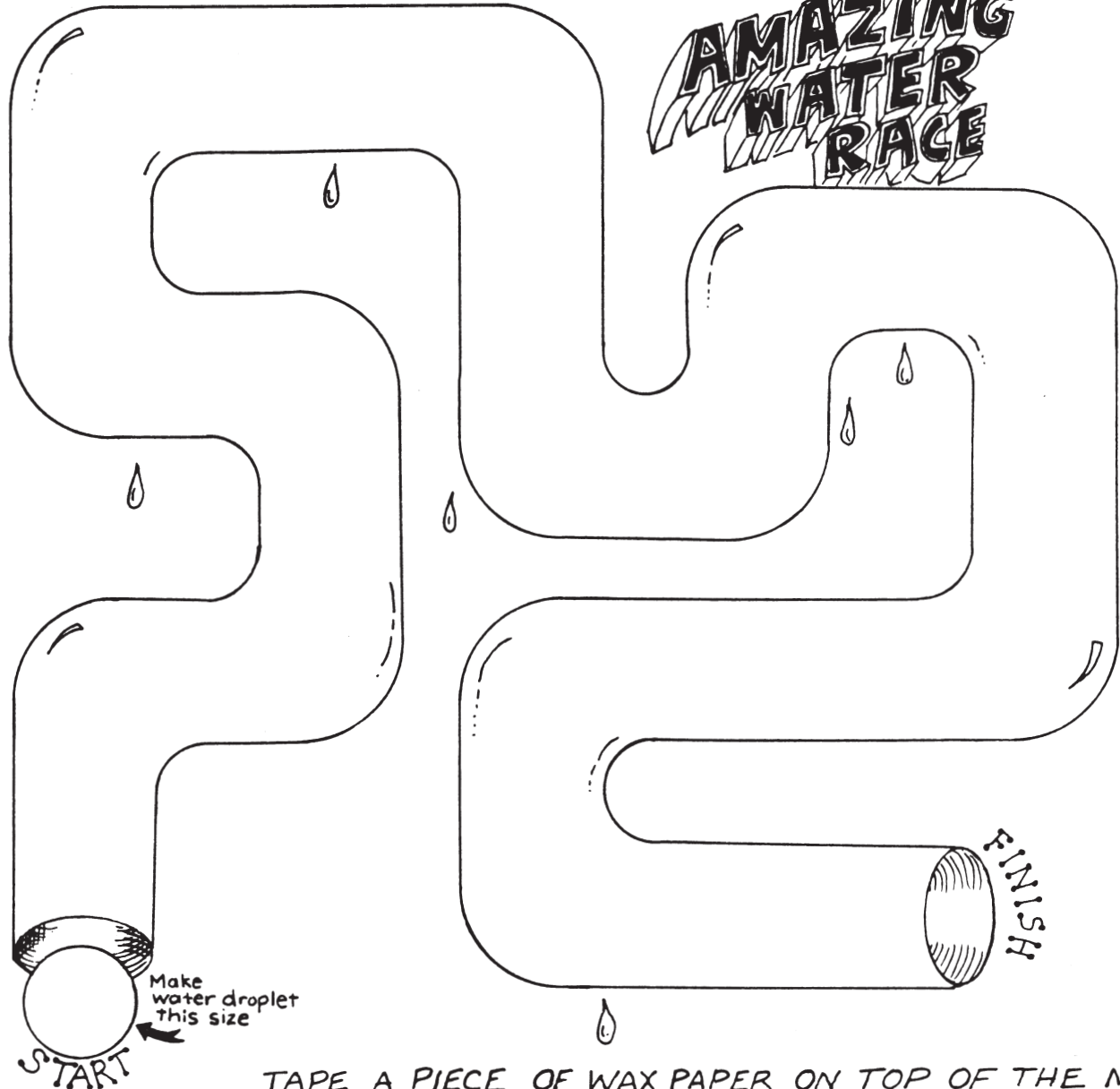
3

4

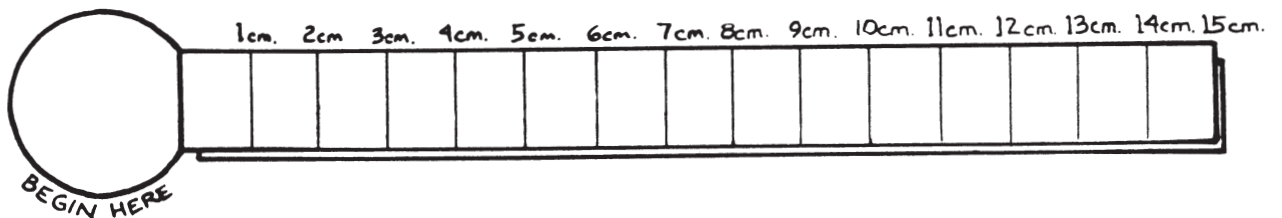
* REMEMBER to subtract the lower number from the higher number.

* Keep your difference as low as possible.

AMAZING WATER RACE



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



WATER
STRETCH

Fold'n Float

MAX CANTU '87

• **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 (2/3's full of H₂O), 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.

MAZE

EVENT:

H₂O RACE

'87 MAX CANTU

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

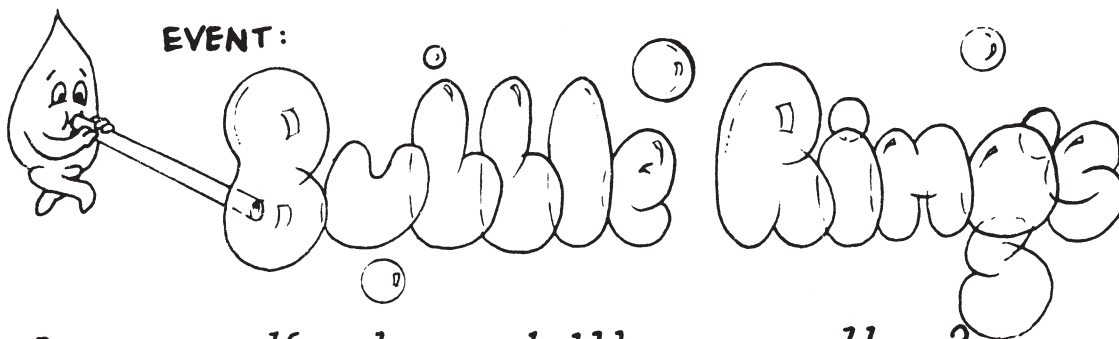
PROCEDURE: ① TAPE A PIECE OF WAX PAPER ON TOP OF THE MAZE.

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.

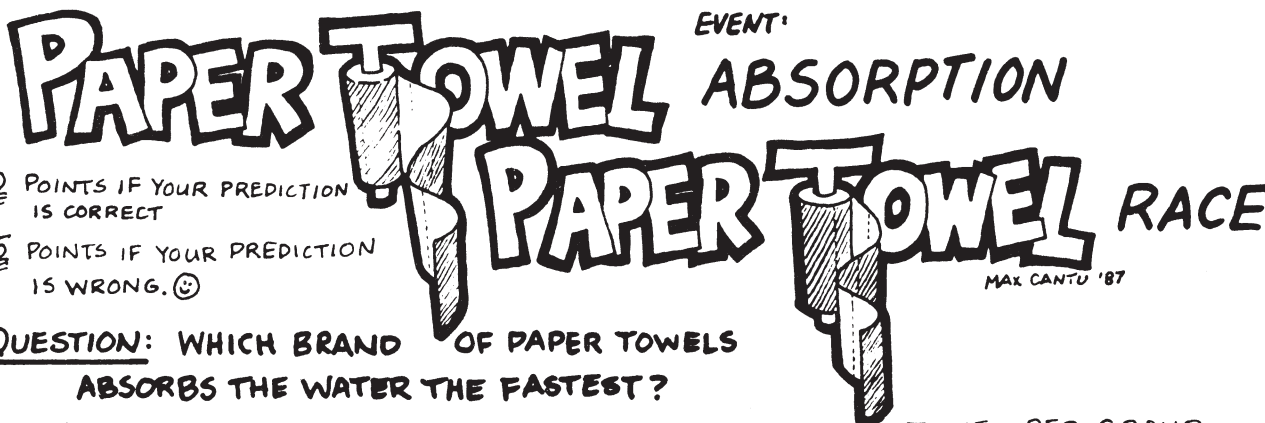
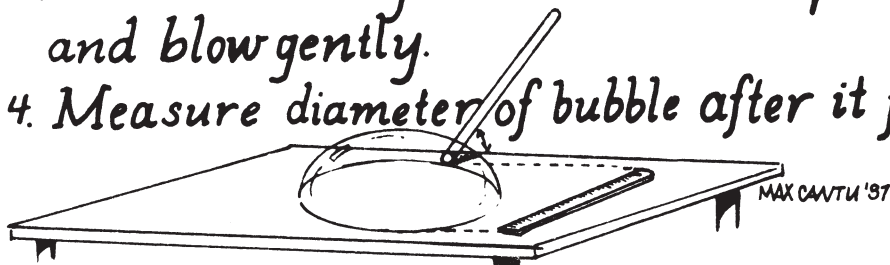


Question: How large a bubble can you blow?

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.



- 110 POINTS IF YOUR PREDICTION IS CORRECT
- 115 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 H₂O.

- MARK EACH STRIP AT THE 18 cm MARK.
- PLACE 1 STRIP FROM EACH OF THE TEST STRIPS INTO A BOWL OF H₂O 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.