



GREAT ARIZONA PUPPET THEATER  
ZONER AND THE DRIP  
Arizona Science and Social Studies Standards

**“Zoner and the Drip” Grade 1**

**Science:**

1.E1U1.5 Obtain, evaluate, and communicate information about the properties of Earth materials and investigate how people use natural resources.

1.L2U1.8 Construct an explanation describing how organisms retain resources from the environment ~~including materials that are used again by other organisms.~~

**Social Studies:**

1.E2.1 Explain how needs, wants, and availability of resources affect decision making.

1.G2.1 Compare how human activities affect culture and the environment now and in the past.

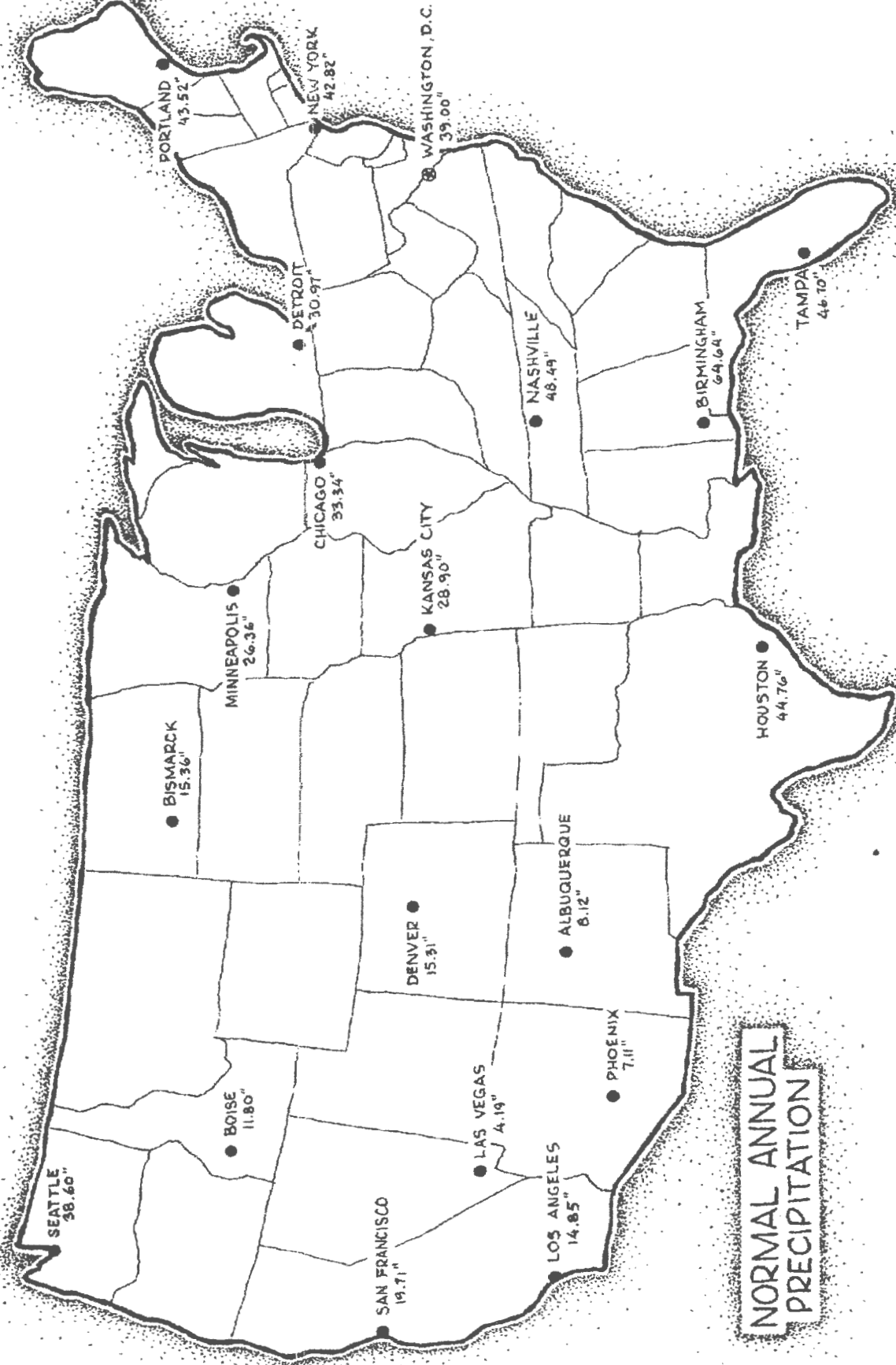
1.C1.1 Apply values of respect, responsibility, equality, and fairness to community.

**“Zoner’s Water Cycle” Grade 4**

**Science:**

4.E1U3.9 Earth Systems: Construct and support an evidence-based argument about the availability of water and its impact on life.

# WHERE DOES THE WATER FALL?



1. Which of the cities listed gets the most precipitation each year?
2. Which gets the least?
3. How many cities listed receive less rainfall than Phoenix?
4. Of the cities listed, what is the average precipitation nationwide?

## THE WATER CYCLE

The smallest particle of water that is still water is called a *molecule*. Each water molecule is made up of *two atoms of hydrogen* and *one atom of oxygen*.

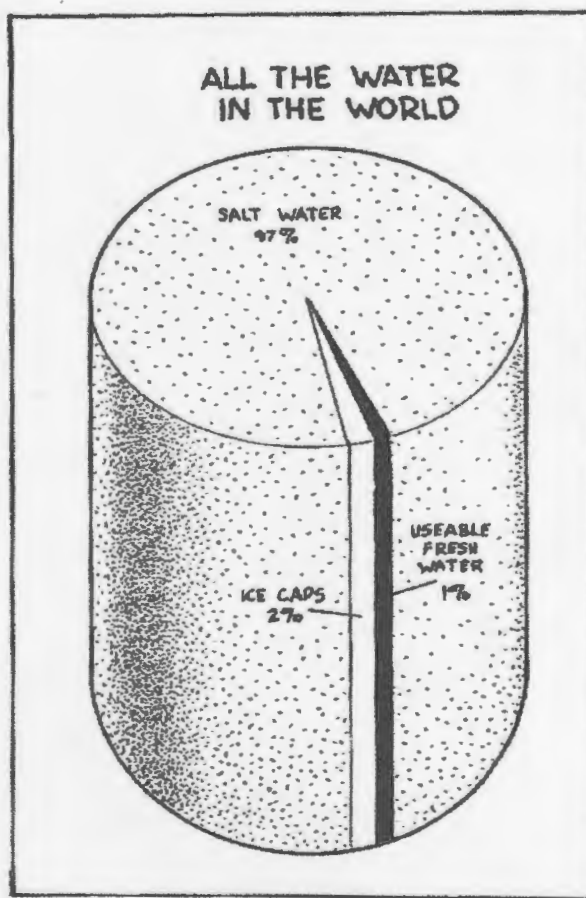
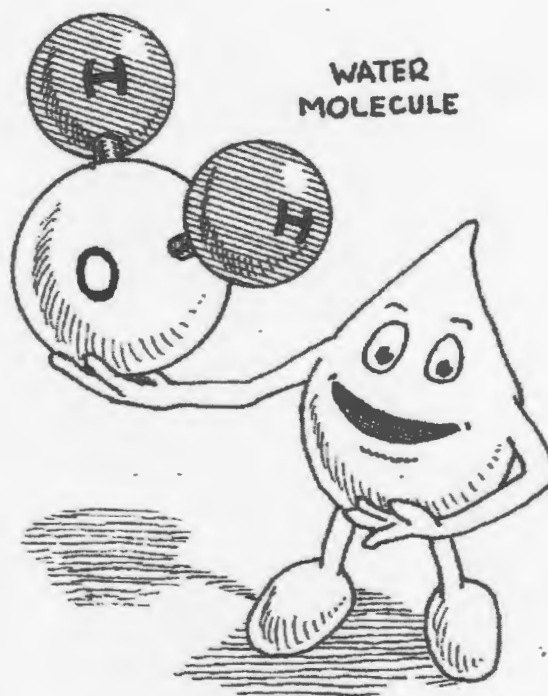
The water on earth today has been on earth and its atmosphere for millions of years.

Sometimes water changes its shape. It can be a liquid, as in a river or lake, or when it comes out of your faucet. It can be a solid, as in a glacier or an ice cube. It can be a gas when it *evaporates* and travels into the air as *water vapor*.

Water molecules that collect together in the air form a cloud. As the molecules move closer to each other, they get heavier and fall to earth as rain, hail, sleet, or snow. Water falling to earth is called *precipitation*. Eventually, the water evaporates again. This *hydrologic cycle* never stops.

Precipitation helps to fill streams, lakes and rivers (*surface water*). Surface water percolates or moves downward through rocks and soil to underground *aquifers*. Water stored under the ground in an aquifer is called *groundwater*. Sometimes groundwater rises to the surface through springs. People pump groundwater from wells so it can be used.

Of all the water on earth, 97% is salt water. Slightly more than 2% is fresh water frozen in glaciers and the polar ice caps. Less than 1% of the water on earth is fresh water in lakes, streams, rivers and aquifers, and most of that is difficult to obtain. Water is continuously changing form but the total amount of water on earth remains the same.



## SAVE OUR WATER NOW!

*Water goes around and around, but the total supply is constant. There is the same amount of water on earth today as when George Washington was president. Here in Arizona we get far less rainfall than most of the rest of the USA. This scarcity of water and our growing population leave us no choice. We must save water!*

List 4 ways your family can save water inside your home.

- 1.
- 2.
- 3.
- 4.

List 4 ways your family can save water outside your home.

- 1.
- 2.
- 3.
- 4.

Draw a cartoon showing one of your ideas:

## ARIZONA'S WATER GOES AROUND AND AROUND --

Throughout history, people have settled near fresh water.

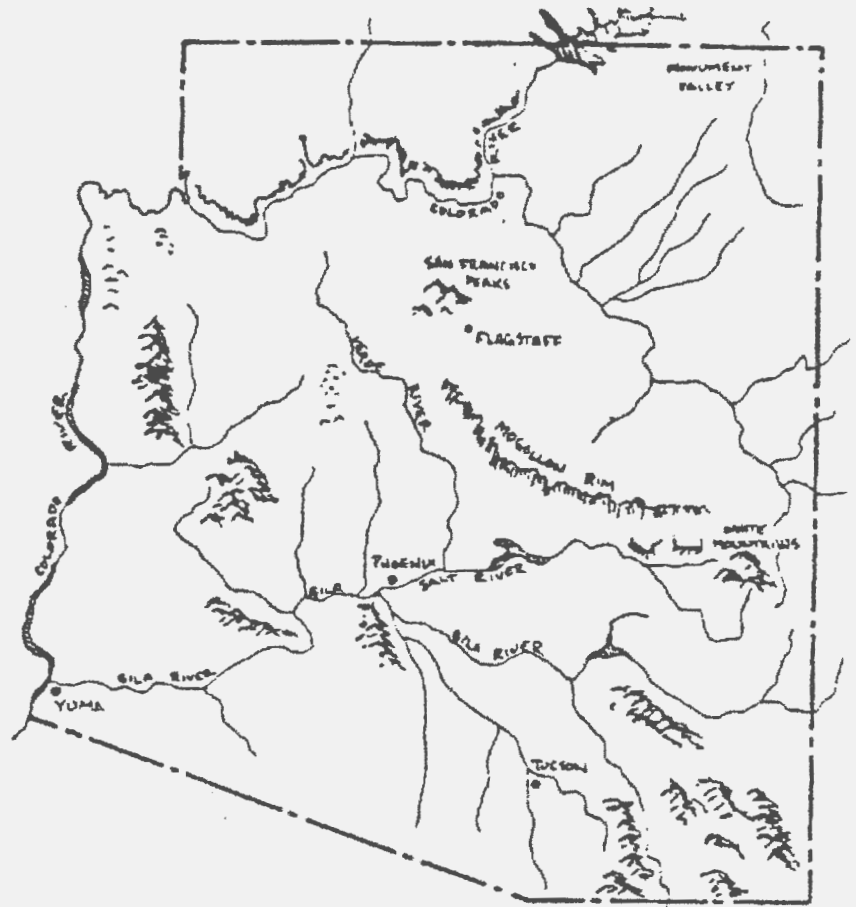
More than 1000 years ago, Hohokam farmers built a system of canals to carry water from the Salt River to their farms in what is now Phoenix. In the early 1860's, long after the Hohokam were gone, pioneers began to arrive in the Salt River Valley to settle and farm.

Among these pioneers was Jack Swilling, an adventurer, miner and ex-Confederate soldier. He started a company that cleaned out and used the old Indian canals to irrigate crops. The main ditch was known as the Salt River Valley Canal. Within a year, 600 acres were irrigated by Swilling's canals. The harvest encouraged more settlers to come to the valley. In 1868 the village was formally recognized as Phoenix.

Most of the water used by City of Phoenix residents now comes from the Salt and Verde rivers and flows through the Arizona Canal and South Canal to water treatment plants. However, most of the water for Phoenix residents living north of the Arizona Canal comes all the way from the Colorado River through the Central Arizona Project (CAP) Canal. Colorado River water is shared by seven states and Mexico.

Water travels by canals to water treatment plants where it is treated, filtered and carefully tested. It is stored in covered reservoirs until it flows through pipes under the streets to homes and businesses.

Groundwater, pumped from wells, is used to supplement the surface water supplies from rivers. Use of groundwater and surface water is carefully monitored and regulated by the State of Arizona. Each city can only use a certain amount of water.



After water is used, it goes down the drain and travels through sewer pipes to a wastewater treatment plant. Here the water is cleaned before it is returned to the environment. The cleaned water may be used by farmers to irrigate their crops; by industry, such as to cool the nuclear

reactors at Palo Verde Nuclear Generating Station; to water grass and create lakes at golf courses; and eventually, to recharge the underground aquifers.

The process of cleaning wastewater creates useful by-products, including natural gas for cooking and heating, and fertilizers and soil conditioners for farmers and gardeners.

Because water is so scarce in Arizona, the use and treatment of water is carefully regulated. Many towns and cities demand that new golf courses must be watered with reclaimed water (treated wastewater). The state and federal government set standards for the quality of water and treated wastewater depending on how it is used. The technologies surrounding the treatment of water and wastewater are growing fields.

The City of Phoenix helped pay to build Desert House to test many water conservation devices and techniques. The house, located in Desert Botanical Garden, uses xeriscape landscaping, low-flow toilets and appliances. It also has extensive computerized monitoring equipment to determine how water is used by residents. A special demonstration building helps people learn about water conservation and other aspects of life styles compatible with a desert environment.

1. Where does the water that comes into your house come from?
2. What are some ways that treated wastewater is now used?
3. How do you think treated wastewater could be used in the future?

## **WATER WORDS**

**H<sub>2</sub>O** - the chemical formula for water. It means there are two atoms of hydrogen and one atom of oxygen in every molecule of water

**groundwater** - water that is under the ground. People use groundwater by pumping it from wells

**wastewater** - water that has gone down the drain

**sewer** - pipes under the street to carry wastewater to a treatment plant

**water treatment plant** - a place where water is treated and checked to be sure it is safe for use

**wastewater treatment plant** - a place where wastewater is cleaned, treated and checked before it is re-used or returned to the environment to make sure it is safe for its intended use

**clarifier** - a step in wastewater treatment that allows sludge to sink to the bottom, and scum to rise to the surface

**bacteria** - microscopic, one-celled animals

**degriiter** - a part of a wastewater treatment plant where the water is slowed down so heavy, sandy material (grit) can sink to the bottom and be removed

**sludge** - solid matter produced by treatment of water and sewage

**scum** - waste that floats on water, such as grease and oil

**alum** - a mineral used in water treatment that causes small particles in the water to stick to each other, and then settle to the bottom

**landfill** - a carefully selected site where solid waste is disposed

**chlorine** - an element used as a disinfectant to rid water of harmful bacteria and germs

**aerator** - a part of a water or wastewater treatment plant that forces air (oxygen) into the water

**aerobic organism** - a living thing (plant or animal) that needs or lives in the presence of oxygen

**anaerobic organism** - a living thing that does not need oxygen

**filter** - a device used to remove solids or chemicals from a mixture or to separate materials. Materials are frequently cleaned from water by using filters.

**percolation** - the movement of water through fractured rock or soil

**evaporation** - the process by which water becomes a vapor

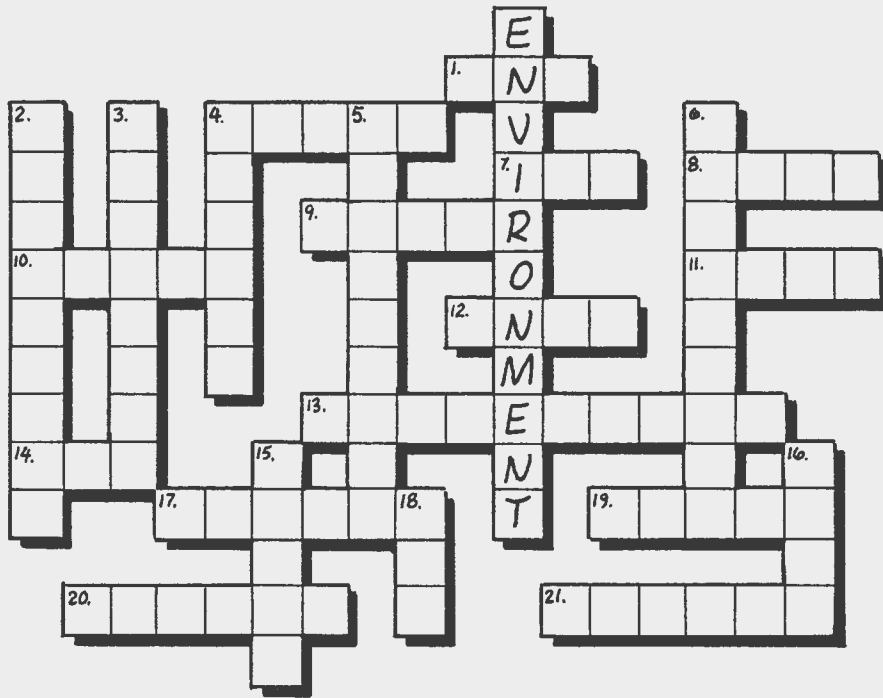
**precipitation** - water falling on the earth as hail, rain, mist, sleet, or snow. The process where atmospheric water becomes surface water

**condensation** - the changing of gas or vapor into a liquid

**cloud** - a mass of visible vapor or water or icy particles floating in the atmosphere

**transpiration** - the process where water vapor is given off into the air by plants





**ACROSS**

1. Each molecule of water has two atoms of hydrogen and \_\_\_ atom of oxygen
4. Sewage travels through \_\_\_\_\_ pipes or mains under the street
7. Water in its solid form
8. Liquid precipitation
9. Water in its gaseous state is called water \_\_\_\_\_
10. Tiny water droplets gathered in the sky
11. Adding this to water makes suspended particles of dirt stick together so they can be removed
12. Precipitation when it's cold
13. Water that goes down the drain
14. Zoner and \_\_\_ Drip
17. "I don't want to go to the big \_\_\_\_\_!"
19. H<sub>2</sub>O is another name for it
20. Helps to clean water
21. Zoner turns it on to get clean water

**DOWN**

2. Water seeping into the ground
3. Added to water to kill germs
4. Sinks to the bottom in the clarifier
5. Water going into the air
6. Down the drain, through the sewer, to the wastewater \_\_\_\_\_ plant
15. Source of surface water
16. Sandy material removed by degritters
18. Each molecule of water has one atom of oxygen and \_\_\_ atoms of hydrogen

**WORD LIST**

WASTEWATER	ICE	CLOUD
RAIN	SNOW	GRIT
RIVER	SLUDGE	ONE
PERCOLATE	CHLORINE	VAPOR
SEWER	FAUCET	THE
TREATMENT	WATER	ALUM
EVAPORATE	FILTER	TWO
THE	TOILET	FAUCET

IT'S  
ZONER'S  
PAL,

**D RIP!**

AND HE'S A  
PAPER BAG  
PUPPET!

CUT OUT TOP AND BOTTOM  
PIECES SEPARATELY.  
GLUE TOP PIECE TO FLAP  
OF PAPER BAG AND  
BOTTOM TO MAIN PART  
OF BAG.



TOP AND  
BOTTOM  
PIECES SHOULD  
OVERLAP.

