DA DROPS

PRE-VISIT ACTIVITIES

for grades 1-3

Developed by:

Environmental Education Exchange

738 N. 5th Avenue, Suite 100
Tucson, Arizona 85705

Telephone: (520) 670-1442

http://www.eeexchange.org
outreach@eeexchange.org

Dear Teacher:

Thank you for participating in Tucson Water's *Da Drops* program!

This booklet contains three activities: An activity describing the physical properties of water, a water cycle crossword puzzle utilizing new vocabulary, and a sensory awareness exercise to help students realize how essential water is for all life. You will also find some useful background information on the history of water in Tucson.

Remember:

- **Please make advance arrangements to reserve a room where all of the presentations can take place.** The students from each class will rotate through this room. Students typically sit on the floor in front of the table.

  On the day of the presentations, we'll also need:
  - a TV / VCR
  - a large cleared table

See you soon!

Dr. Faucet

For more information or additional copies of this packet, please contact:

Outreach Education Coordinator
Environmental Education Exchange
738 N. 5th Ave., Suite 100
Tucson, AZ 85705
(520) 670-1442
outreach@eeexchange.org

Da Drops is sponsored by:

Tucson Water
P.O. Box 27210
Tucson, AZ 85726
(520) 791-4331

DA DROPS OVERVIEW

A water education program for 1st through 3rd grade students in Tucson, Arizona.
Developed and funded by Tucson Water, the City of Tucson public water utility.

Tucson Water's *Da Drops* is an interdisciplinary program that has been specifically designed for first through third grade learners and focuses on the water cycle, water supply, and water conservation in the Tucson Basin. It poses three questions:

- Where does our water come from?
- Where does it go?
- What can we do to conserve this vital natural resource?

In answering these questions, these concepts are addressed:

- the water cycle (with emphasis on the states of water: solid-liquid-gas)
- water supply (groundwater, Colorado River water, reclaimed water)
- water conservation

***Da Drops* is a three-part program:**

PART ONE includes three fun pre-visit classroom activities. Conducting these activities in advance ensures that students will get the most out of the on-site presentation. Evaluate these lessons and modify as needed based on the grade level and abilities of your students.

PART TWO includes a lively and interactive one-hour on-site presentation. Students play a water cycle game, participate in demonstrations with a groundwater model, and discover how to be "water smart." At the end of the presentation, all students receive a water smart cup to take home.

PART THREE includes a ten-page activity booklet full of mazes and word searches, pages to color, and new fun facts to discover. This fun booklet will help students remember the many things they learned from their special visitor, Dr. Faucet.

TEACHER BACKGROUND READING

Tucson's inhabitants continue to live in a delicate balance with water. Here in the Sonoran Desert we receive only 12 inches (30.5 cm) of rain each year and have no perennial (continuously flowing) rivers nearby. Our city's population has grown from 7,500 in 1900 to over 880,000 in the metro area just a century later. In addition to our extraordinary population growth, lifestyle amenities such as swimming pools, outdoor landscaping, and daily showers have resulted in a rapid depletion of our groundwater. In 1875, Tucsonans could dig just 25 feet (7.5 m) underground to access water, and the local Santa Cruz River flowed perennially. Today the river is dry and we must drill 250-300 feet (75-90 m) down in order to pump up groundwater.

With the water table still dropping in some areas at a rate of four feet per year, Tucsonans have recently accepted water from a second major source, the Colorado River. In 2001, Tucson Water began using groundwater blended with river water that was pumped 336 miles (541 km) from Lake Havasu via the Central Arizona Project canal. This Colorado River water is recharged into large basins west of the Tucson Mountains, where it percolates down to the water table before it is pumped up and into Tucson. By the end of this decade, Tucson's water supply will likely reach a ratio of 50 percent groundwater and 50 percent Colorado River water.

Even though we now have a second major water source, the practice of conserving water in Tucson is as important as ever. The Colorado River is not a limitless supply of water, and the Southwest is one of the fastest growing regions in the country. Tucson Water's outreach programs promote a water-conscious culture by fostering a deeper understanding of our relationship with water in the desert. The *Da Drops* program seeks to provide students with a fun learning experience that will raise their appreciation of water and generate enthusiasm for water-saving practices.

ARIZONA DEPARTMENT OF EDUCATION ACADEMIC STANDARDS

The *Da Drops* program addresses the following Academic Standards. (Complete versions of the Academic Standards are available at http://www.ade.state.az.us.)

SCIENCE STANDARDS	ACTIVITY #1	ACTIVITY #2	ACTIVITY #3	PRESENTATION	POST-VISIT BOOKLET
SC01-S1C1-01 Compare common objects using multiple senses.	✔				
SC01-S1C1-02 Ask questions based on experiences with objects, organisms, and events in the environment.	✔		✔		
SC01-S5C1-02 Classify materials as solids or liquids.	✔			✔	
SC01-S6C1-01 Describe the following basic earth materials: rocks, soil, water.	✔		✔	✔	
SC01-S6C1-03 Identify common uses (e.g., construction, decoration) of basic earth materials (i.e., rocks, water, soil).			✔	✔	✔
SC01-S6C1-04 Identify the following as being natural resources: air, water, soil, trees, wildlife.			✔	✔	
SC01-S6C1-05 Identify ways to conserve natural resources (e.g., reduce, reuse, recycle, find alternatives).			✔	✔	✔
SC02-S1C1-01 Formulate relevant questions about the properties of objects, organisms, and events in the environment.			✔		
SC02-S5C1-02 Classify materials as solids, liquids, or gases.	✔			✔	
SC02-S5C1-03 Demonstrate that water can exist as a gas—vapor; liquid—water; and solid—ice.				✔	
SC03-S1C1-01 Formulate relevant questions about the properties of objects, organisms, and events of the environment using observations and prior knowledge.			✔		

ARIZONA DEPARTMENT OF EDUCATION ACADEMIC STANDARDS CON'T

SOCIAL STUDIES STANDARDS	ACTIVITY #1	ACTIVITY #2	ACTIVITY #3	PRESENTATION	POST-VISIT BOOKLET
SS01-S1C1-03 Use primary source materials (e.g., photos, artifacts, maps) to study people and events from the past.				✔	
S01-S1C10-01 Use information from written documents, oral presentations, and the media to discuss current local and state events.				✔	
SS01-S3C4-01 Identify examples of responsible citizenship in the school setting and in stories about the past and present.				✔	
SS01-S3C4-03 Discuss the importance of students contributing to a community (e.g., helping others, working together, cleaning up the playground.)				✔	
SS01-S4C1-04 Recognize characteristics of human and physical features: a. physical (i.e., ocean, continent, river, lake, mountains, islands); b. human (i.e., equator, North and South Poles)		✔		✔	
SS01-S4C2-02 Discuss physical features (e.g., mountains, rivers, deserts) in the world.		✔		✔	
SS01-S4C2-04 Discuss the ways places change over time.				✔	
SS01-S4C3 Correlates with SC01-S6C1.	✔		✔	✔	✔
SS01-S4C5-01 Identify ways (e.g., clothing, housing, crops) humans adapt to their environment.				✔	
SS01-S4C5-01 Identify resources that are renewable, recyclable, and non-renewable.				✔	

ARIZONA DEPARTMENT OF EDUCATION ACADEMIC STANDARDS CON'T

SOCIAL STUDIES STANDARDS CON'T	ACTIVITY #1	ACTIVITY #2	ACTIVITY #3	PRESENTATION	POST-VISIT BOOKLET
SS01-S5C1-02 Recognize that people need to make choices because of limited resources.			✔	✔	
SS02-S1C1-04 Use primary source materials (e.g., photos, artifacts, interviews, documents, maps) and secondary source materials (e.g., encyclopedias, biographies) to study people and events from the past.				✔	
SS02-S1C10-01 Use information from written documents, oral presentations, and the media to describe current events.				✔	
SS02-S3C4-01 Discuss examples of responsible citizenship in the school setting and in stories about the past and present.				✔	
SS02-S3C4-03 Describe the importance of students contributing to a community (e.g., helping others, working together, service projects).				✔	
SS02-S4C1-05 Recognize characteristics of human and physical features: a. physical (i.e., ocean, continent, river, lake, mountain range, coast, sea, desert); b. human (i.e., equator, Northern and Southern Hemispheres, North and South Poles).		✔		✔	
SS02-S4C1-06 Locate physical and human features using maps, illustrations, images, or globes: a. physical (i.e., ocean, continent, river, lake, mountain range, coast, sea, desert); b. human (i.e., equator Northern and Southern Hemispheres, North and South Poles, city, state, country).				✔	
SS02-S4C2-03 Discuss physical features (e.g., mountains, rivers, deserts) in the world.				✔	
SS02-S4C2-04 Discuss the ways places change over time.				✔	

ARIZONA DEPARTMENT OF EDUCATION ACADEMIC STANDARDS CON'T

SOCIAL STUDIES STANDARDS CON'T	ACTIVITY #1	ACTIVITY #2	ACTIVITY #3	PRESENTATION	POST-VISIT BOOKLET
SS02-S4C5-01 Identify ways (e.g., agriculture, structures, roads) in which humans depend upon, adapt to, and impact the earth.				✔	
SS02-S4C5-02 Recognize ways of protecting natural resources.				✔	
SS02-S5C1-01 Discuss how scarcity requires people to make choices due to their unlimited needs and wants with limited resources.			✔	✔	
SS03-S1C1-03 Use primary source materials (e.g., photos, artifacts, interviews, documents, maps) and secondary source materials (e.g., encyclopedias, biographies) to study people and events from the past.				✔	
SS03-S1C10-01 Describe current events using information from class discussions and various resources (e.g., newspapers, magazines, television, Internet, books, maps).				✔	
SS03-S3C4-02 Describe the importance of students contributing to a community (e.g., service projects, cooperating, volunteering).				✔	
SS03-S4C1-06 Recognize characteristics of human and physical features: a. physical (i.e., ocean continent, river, lake, mountain range, coast, sea, desert, gulf, bay, strait, plain, valley, volcano, peninsula); b. human (i.e., equator, Northern and Southern Hemispheres, North and South Poles, city).		✔		✔	
SS03-S4C1-07 Locate physical and human features using maps, illustrations, images, or globes: a. physical (i.e., seven continents, four oceans, river, lake, mountain range, coast, sea, desert, gulf, bay, strait, peninsula); b. human (i.e., equator, Northern and Southern Hemispheres, North and South Poles, city, state, country, roads, railroads).				✔	
SS03-S4C2-02 Describe how physical and human characteristics of places change from past to present.				✔	

ARIZONA DEPARTMENT OF EDUCATION ACADEMIC STANDARDS CON'T

SOCIAL STUDIES STANDARDS CON'T	ACTIVITY #1	ACTIVITY #2	ACTIVITY #3	PRESENTATION	POST-VISIT BOOKLET
SS03-S4C5-01 Identify ways (e.g., farming, building structures and dams, creating transportation routes, overgrazing, mining, logging) in which humans depend upon, adapt to, and impact the earth.				✔	
SS03-S4C5-02 Describe ways of protecting natural resources.				✔	
SS03-S4C5-03 Identify resources that are renewable, recyclable, and non-renewable.				✔	
SS03-S5C1-01 Identify how scarcity requires people to make choices due to their unlimited wants and needs.			✔	✔	
LANGUAGE ARTS STANDARDS					
LS-F1 Use effective vocabulary and logical organization to relate or summarize ideas, events and other information.	✔	✔		✔	
VP-F3 Access, view and respond to visual forms such as computer programs, videos, artifacts, drawings, pictures and collages.		✔		✔	✔
VP-F4 Interpret visual clues in cartoons, graphs, tables and charts that enhance the comprehension of text.		✔			✔
VISUAL ARTS STANDARDS					
VA-S1C1, S1C2, S1C3, S1C4, S1C5 Create: Student will create artworks to communicate ideas, meanings, and/or purposes.			✔		

Teacher Note: Pursuing the Follow-up/Extension Ideas will allow you to address additional ADE standards in a variety of subject areas.

ACTIVITY #1: WONDERING ABOUT WATER

This lesson involves a short class discussion in which students share observations about the physical properties of water, consider what they already know about water, and begin to place this in the context of science concepts.

Arizona Department of Education Academic Standards
Please refer to the Arizona Department of Education Academic Standards section for the ADE standards addressed by this lesson.

Instructions: In advance, collect several hands-on objects to enhance class discussion (cups of water, cups of ice, cups of soil, rocks, and pieces of wood; also if available pictures of water in the environment as rain, snow, rivers, lakes, etc.). Use these items and the following to guide a short discussion about water:

Is water important to us?

- Yes, it's very important! Like all living things, we must have water to live!

What can we observe about water with our five senses?

- Eyes / sight?
- Ears / sound?
- Nose / smell?
- Mouth / taste?
- Touch?

What else do we know about water?

- ***Welcome a variety of observations.***
- It can be a solid, liquid, or gas.
- It is a material that comes from the earth.

How is water alike or different than other objects or materials (like soil, rocks, wood, air, etc.)?

- ***Welcome a variety of observations.***
- Nothing else occurs as solid, liquid, and gas within the range of temperatures commonly found on Earth.

Where in our natural environment can we find water?

- In washes, streams, rivers, puddles, lakes, etc. – This is called **surface water**.
- Underground between rocks, sand, and clay – This is **groundwater** and the layers of rock, sand, and clay that hold it are called an **aquifer**.
- Falling from the sky as rain or snow – This is **precipitation**.
- Flowing down the street, in washes, etc. after rain – We call this **runoff**.
- In the atmosphere as water vapor, after **evaporation** from a liquid to a gas form.

All this water is part of the **water cycle**. The water cycle includes all the places we find water and all the ways water moves around in the environment. We'll explore this more in our next activity!

ACTIVITY # 2: DESERT WATER CYCLE CROSSWORD PUZZLE

Completing this crossword puzzle serves to introduce students to several vocabulary words related to the water cycle. These concepts will be explored more fully during the special presentation by Dr. Faucet.

Arizona Department of Education Academic Standards
Please refer to the Arizona Department of Education Academic Standards section for the ADE standards addressed by this lesson.

Instructions: In advance, photocopy the Picture Crossword Puzzle. Also make a copy of the Water Words overhead transparency onto transparency plastic. Use the overhead transparency and the definitions below to guide students as they fill in the puzzle. Students may also color the drawing.

aquifer	underground layers of rock, sand, and clay that hold water
desert	a dry region that receives very little precipitation
evaporation	the changing of water from a liquid into a gas form
groundwater	water that is underground between rock, sand, and clay
percolation	the sinking of water underground
precipitation	water falling in liquid state (rain) or solid state (snow) from the clouds to the earth
runoff	water that flows downhill after it rains or snows
Santa Cruz River	Tucson's largest river, which now flows only after heavy rain storms
water table	the level of groundwater closest to the Earth's surface
well	a hole that humans dig down into the ground to find water

Water Words

OVERHEAD TRANSPARENCY

aquifer

desert

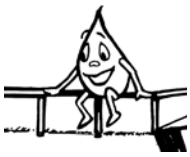
evaporation

groundwater

percolation

precipitation

runoff

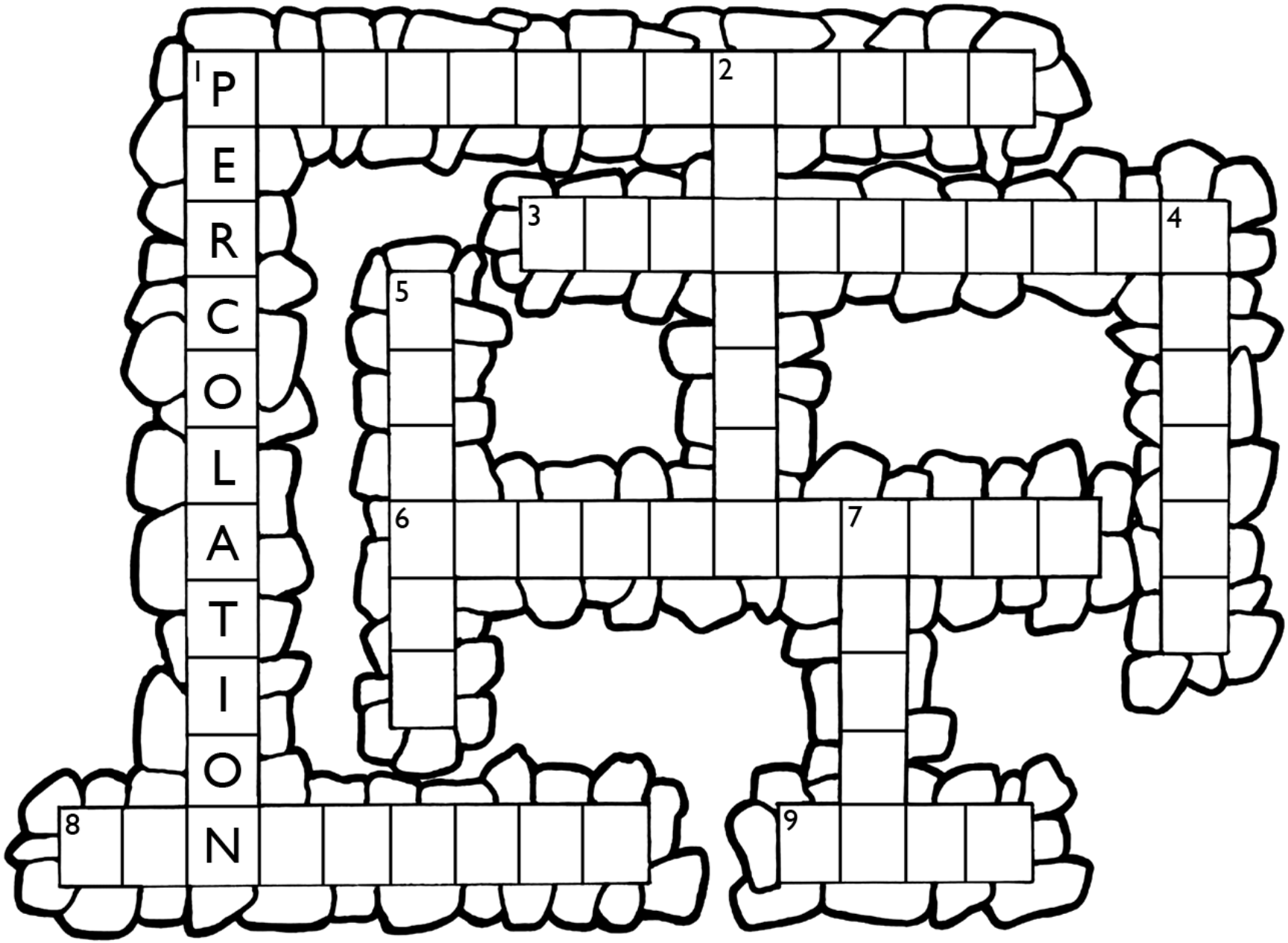


Santa Cruz

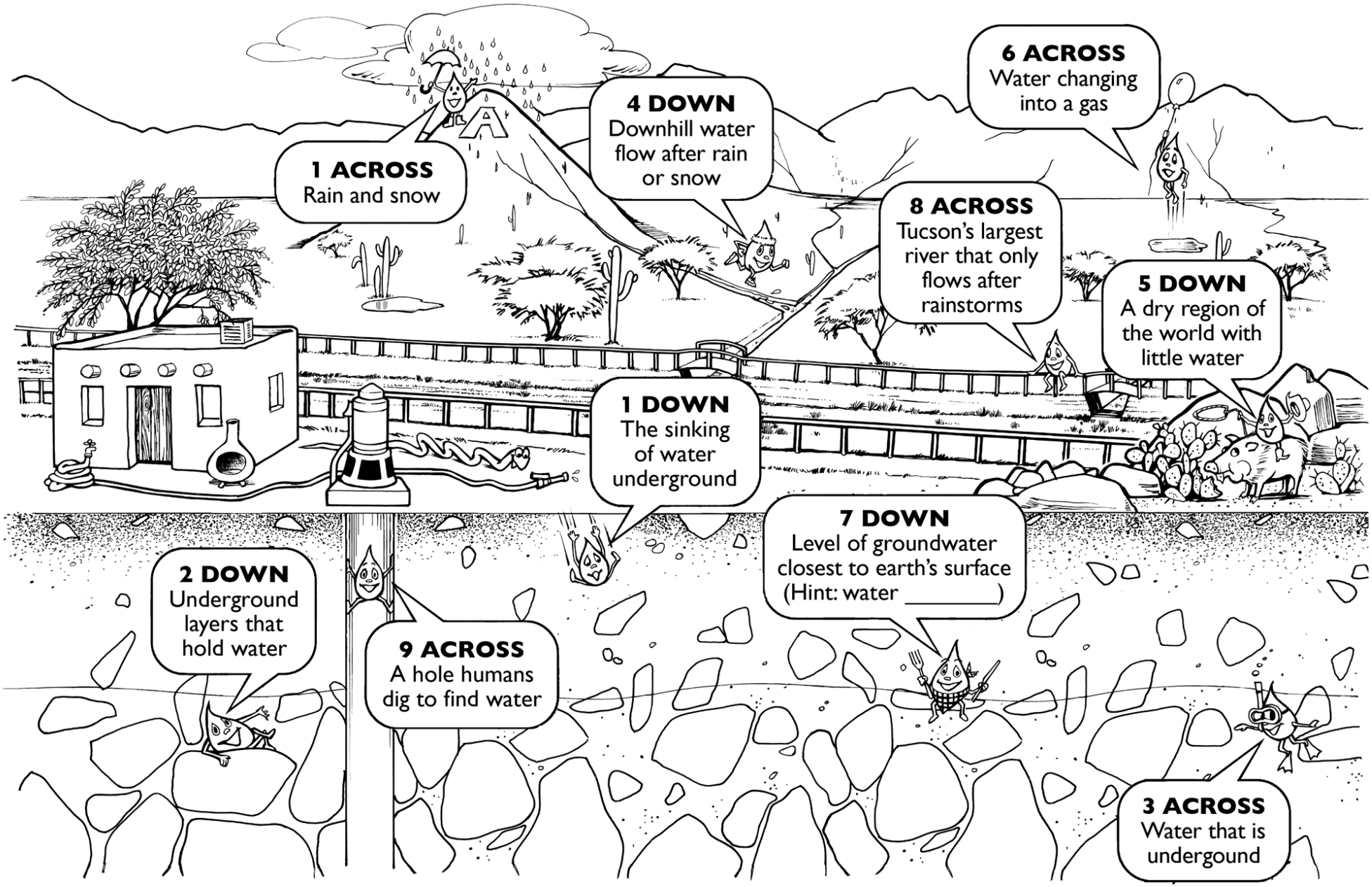
Rive 

water table

DESERT WATER CYCLE PICTURE CROSSWORD PUZZLE



DESERT WATER CYCLE PICTURE CROSSWORD PUZZLE



ACTIVITY #3: CAN YOU IMAGINE... LIFE WITHOUT WATER?

In this activity, students learn to recognize water as a natural resource, make drawings of ways we use water, and explore water's role in our lives. Students gain a deeper understanding of water, the many ways we use it, and how essential it is for all life.

Arizona Department of Education Academic Standards
Please refer to the Arizona Department of Education Academic Standards section for the ADE standards addressed by this lesson.

Instructions: Have paper and crayons or colored pencils ready. Then follow these steps:

1) Begin by asking the class to brainstorm ways that we use water. List students' ideas on the board. Use prompting questions as needed to ensure that the list includes ways that students use water in their own lives and ways that society as a whole uses water (to grow food, to make electricity, in manufacturing processes, to carry wastes away from our homes).

2) Still writing on the board, ask if students know what a **resource** is. Define resource as a source or supply from which we can draw in time of need. Define **natural resources** as resources we take from the natural environment. These include air, water, soil, trees, and wildlife.

3) Be sure students all have paper and crayons or colored pencils. Ask everyone to sit quietly and close their eyes as you read this short guided visualization:

> "Imagine a glass of water sitting in front of you. What does the water look like? Imagine that you are very thirsty. Pretend you take a sip. What does it taste like? Imagine putting your finger in the water. What does it feel like? Now imagine that this glass of water grows until it becomes a pool big enough for you. Imagine yourself floating on the water, starting up at the sky. What does it feel like to float? Now think about your favorite place with water or your favorite way to use water. Imagine that you are in that favorite place or that you are doing that favorite thing....Now quietly open your eyes and draw your favorite place with water or favorite way to use water."

4) Remind students of all the ways we use water and that water is an important **natural resource**. Invite students to turn over their paper and make a second drawing, this time of a way of using water that they think is important to everyone.

5) When students have finished, ask volunteers to share and explain their drawings. Use this to generate discussion about the importance of water. Can you imagine life without water? Discuss how a scarcity of water would affect our daily lives. Affirm that water is essential to every living thing!

6) Ask students what questions they have about water. Discuss as you wish. List selected questions on the board and state that a special presenter named Dr. Faucet will visit soon and help the class learn more about water.

FOLLOW-UP / EXTENSION IDEAS

*The **Da Drops** program sparks student interest in further explorations pertaining to water and can be used as a take-off point for related units of study that also address concepts in the Arizona Department of Education Academic Standards. Teachers may wish to consider pursuing one or more of the extension ideas outlined below. These ideas can also be expanded to embrace additional standards in other subject areas.*

Writing about Water

Students at all grade levels can write about their new understandings about water. They can begin with any of a variety of prewriting exercises (brainstorming, webbing, discussing the purpose and audience of their writing, organizing or outlining their ideas) and then develop a written piece appropriate to their grade level. This would address several writing standards (Strand 1 – writing process, Strand 2 – writing elements, and Strand 3 – writing applications).

Properties of Objects and Materials

For first and second graders, continue to explore water by comparing its properties with those of other materials. First graders can benefit from practice in classifying objects by simple physical properties (shape, texture, size, color, weight) or as solids, liquids, or gases. Second graders can go further by measuring these types of properties and by devising simple demonstrations of how water can exist as a solid, liquid, or gas and by exploring how states of matter are related to shape. These activities would address academic standards SC01-S5C1-01; SC01-S5C1-02; SC02-S5C1-01; SC02-S5C1-02; SC02-S5C1-03; SC02-S5C1-04.

Water and Weather

For first and second graders, consider following Dr. Faucet's presentation with lessons about weather. First graders might simply identify characteristics of weather, including precipitation, and analyze how weather affects their daily lives. Second graders might actually measure and record weather conditions, learn to identify clouds, and analyze relationships between clouds and precipitation. These activities could address several ADE Science Standards, including SC01-S6C3-01; SC01-S6C3-02; SC02-S6C3-01; SC02-S6C3-02; SC02-S6C3-03; SC02-S6C3-04.

Experiments with Plants and Water

Third grade classes might plan and conduct simple experiments in which plants are given adequate water, too much water, and not enough water. Experiments along these lines can involve using appropriate measurement tools and recording and analyzing data. Students could learn about the functions of different plant structures and the fact that water is found throughout a plant. Such explorations could address several academic standards related to science as inquiry, including SC03-S1C2-01; SC03-S1C2-02; SC03-S1C2-03; SC03-S1C2-04; SC03-S1C2-05; SC03-S1C3-01; SC03-S1C3-02; SC03-S1C3-03; other inquiry process standards, and science content standard SC03-S4C1-01.

Water Interactions

Third graders can expand their explorations of water to discuss how the amount of water in the environment affects human populations. Water availability affects human communities in general ways on an ongoing basis. Additionally, extreme events like droughts and floods affect us in other ways. In turn, human activities can affect the environment and the likelihood of drought, floods, and more. Finally, water is one of several environmental factors that affect other living organisms, including their ability to live in a given geographic area. Exploring these topics would address science standards SC03-S3C1-01; SC03-S3C1-02; SC03-S4C3-05.