Answer Key

Page 3: Water: A Fact of Life

- Unscramble the letters to each word to decode the message.
  ssue: uses
  rewat: water
  vilgni: living
  Every living thing uses water.

- True or False Activity
  TRUE: Water is the only substance on Earth that exists in three states of matter: solid, liquid, and gas.
  FALSE: California usually gets a lot of rain during the summer.
  TRUE: All of the food we eat has been grown using water.
  TRUE: Water is very important to California's economy.
  TRUE: It takes a lot of water to make a slice of pizza.
  TRUE: The average person uses 196 gallons of water per day to carry out normal activities.
  FALSE: It doesn't take any water to produce a chicken egg.

- Why does water matter to you?
  How many total ounces of water is this per day? 8 glasses/day x 8 ounces/glass = 64 ounces/day
  Per year? 64 ounces/day x 365 days/year = 23,360 ounces/year
  How many gallons of water do you drink in a year? 23,360 ounces/year x 1 gallon/128 ounces = 182.5 gallon/year
  How many gallons of water would your whole class drink in a year? For an average class size of 30 take 182.5 gallons/student/year x 30 students = 5,475 gallons/year

- Tech Check (Example):
  Two facts about Tomatoes from the text:
  1. There are different varieties for processing and fresh tomatoes.
  2. Processing tomatoes have a thicker skin which helps during transportation.

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Two facts about Tomatoes from the one-minute radio broadcast:

1. California farmers produce about 2 billion pounds of tomatoes each week during the summer.
2. Tomatoes contain Lycopene, an important cancer fighting antioxidant.

What do all crops need to grow? *Sun, Water, Soil*

Page 4: What's in your WATERSHED?

- 8. Why should we be concerned about pollution? *Example answers may include that pollution can get into the water. Plants, animals and people need water to grow and live. Water is necessary for life.* What can you do to prevent pollution in your watershed? *Example answers may include that trash and recyclables should always be thrown away properly. People could walk or ride bicycles instead of driving to school or work. Businesses should be monitored to make sure they are not polluting the air. People should take care at home, school, work, and in their communities to make sure they keep their cities and towns clean and free of pollution.*
  List of things you may find in a watershed: *examples may include the following – forest, lake, river, creek, farms, towns, people, pets, pollution*

- Tech Check: What watershed do you live in? *Example watershed – Rainfall gathers in ponds and lakes. Runoff flows into streams and creeks which travel downstream and form larger rivers, eventually flowing out to the Pacific Ocean.*

- Water Cycle Activity:
  Heat from the sun warms the water in oceans and lakes. Some water turns into water vapor, which is a gas. This process is called evaporation. When water evaporates from the leaves of plants, it is called transpiration. As the water vapor rises into the atmosphere, it cools and forms clouds. This is called condensation. Rain, snow, hail, and sleet are forms of precipitation that fall from clouds when water droplets in the cloud become too heavy to be suspended. In California, about 70% of our surface water falls north of Sacramento. Much of this land is forestland. Some of the rain and melted snow seeps into the ground by percolation and becomes groundwater. The roots of trees and other plants soak up some of the water from precipitation, while other water runs off the surface of the ground into creeks, rivers, and oceans. This is called runoff. Water is used by animals and is also used on farms to water crops grown for people in towns and cities.

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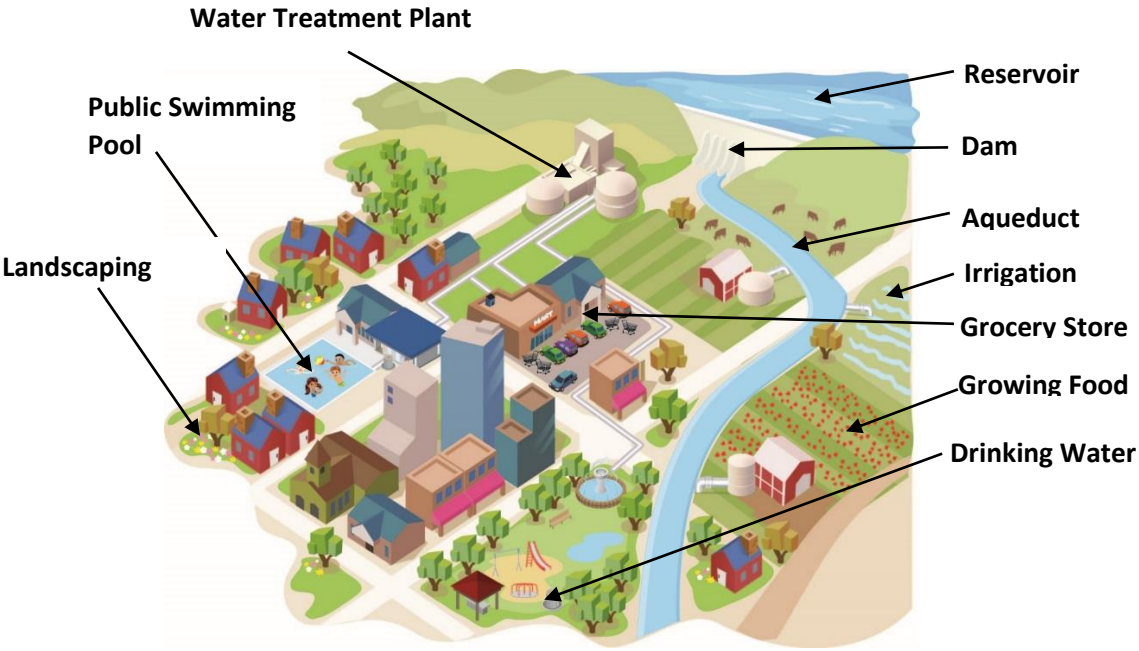
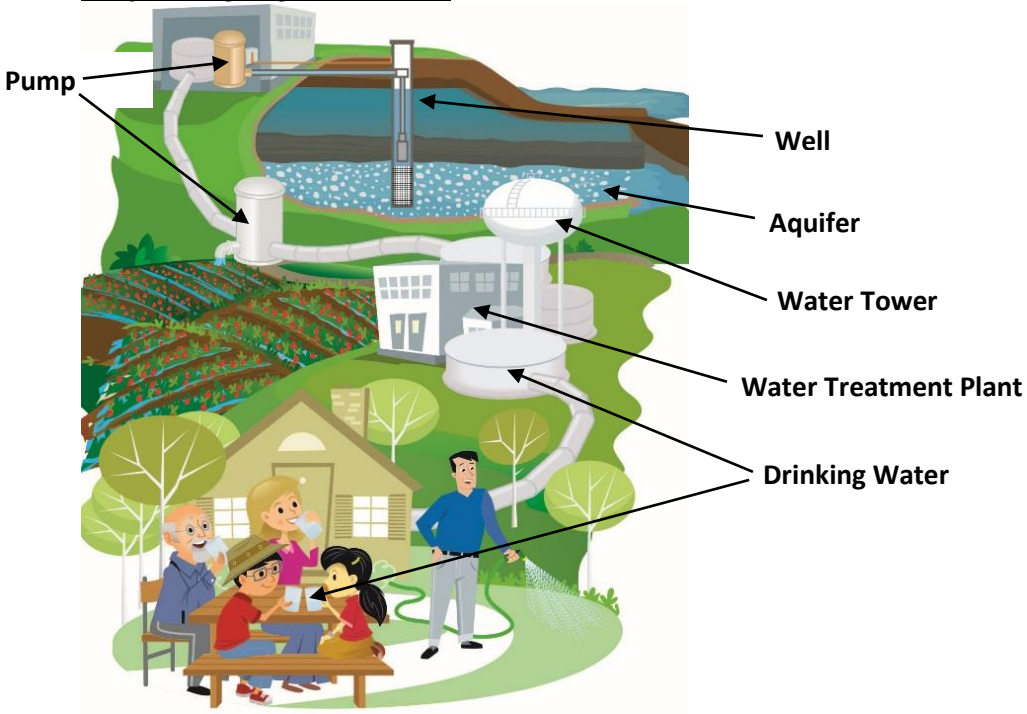
Page 5: Where do we get our Water?

- Activity: How Do We Get Our H_20?
  Ways we get surface water



Ways we get groundwater



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- Water wise
  How many gallons of water could be saved in a week if each person in your house did this? 8 gallons/day x 365 days = 2,920 gallons

Page 6: Drought

- Weather and Climate:
  Do you think you would find the same types of plants and animals living in these two different climate zones? Why or why not? *Plants and animals have adaptations to live in their environments. The environment includes the climate. Hot, dry regions would have plants and animals that don't need as much water or can conserve water. Examples would be cactus or lizards. In the coastal mountain areas you would find plants and animals that require a cooler, wetter climate. Examples would be redwood trees and bears.*

- Activity Cause and Effect
  -Due to the lack of rain during a drought, grasses and other plants in the environment turn brown and die. This means less food for animals like deer and cattle.
  -In 2014, California farmers did not get enough water to grow as much food as they normally do and had to leave more than 410,000 acres unplanted, which meant that 17,000 people lost their jobs.
  -There is a lack of snow during the winter and very little melted snow running off the mountains in the spring and summer. Lake levels drop very low and rivers and creeks begin drying up. People and animals have less water to live on.

- Every drop counts. How can you help? *Answers could include the following:*

Task	**# per day**	**Water saved**	**Total per day**
Take a five minute shower instead of a ten minute shower	1	25 gallons	25 gallons
Fill the bath ½ way full instead of full	0	12 gallons	
Turn water off when brushing teeth	2	6 gallons	12 gallons
Don't use toilet as a wastebasket	0	5 gallons per flush	
Total saved			**37 gallons**

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Task	# per week	Water saved	Total per week
Only wash full loads of laundry	2	16 gallons per load	32 gallons
Only run the dishwasher when full	1	8 gallons per load	8 gallons
Water outdoor landscaping only during cool hours of morning and evening	2	25 gallons each time you water	50 gallons
Place mulch around plants to reduce evaporation	2	25 gallons each time you water	50 gallons
Total saved			**140 gallons**

How much water would be saved if everyone in your house practiced these water saving measures each day? For a family of 5 at 37 gallons per person, 5 x 37 = 185 gallons saved. Each week? 185 gallons + 140 gallons = 325 gallons saved.

- Activity – How does the drought affect you?
  Possible answers could include: Prices for food can be higher, certain foods may not be available, quality of food may not be as good

- Tech Check
  Answers will vary, go to the website to calculate your usage and compare it to a friend's.

Page 7: Preserving our Liquid Gold

- Solar Still Activity
  5a. *Yes. It is fresh.*
  5b. *As the water heated up, it evaporated.*
  5c. *The plastic wrap collected the condensation.*
  5d. *The salt stayed in the bowl.*
  5e. *Answers will vary.*
  5f. *Place the solar still in a warmer location.*

- Letter to a Farmer
  -Math challenge: *In our example, tomatoes need 0.24 inches of water/day and the irrigation system applies 0.046 inches of water per hour. To find out how*

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many hours per day you should run the irrigation system start with an equation: 0.24 inches of water per day = 0.046 inches per hour x N number of hours, so N = O.24/0.046 = <u>5.2 hours/day</u>

Center Pages 8-9: Our Food Grows Where Water Flows

- Activity:
  3. *Northern California has the most lakes and rivers.*
  4. *Most precipitation is in northwest California. The least precipitation is in southeast California*.
  6. *The California aqueduct carries water from Sacramento to Southern California.*
  7. *Most aqueducts are in Southern California because this is the driest region in California.*
  10. *Sacramento River, American River, Cosumnes River, San Joaquin River*
  12. *Getting water to these areas is important because growing food requires water.*
  13. *Example five foods that farmers supply to your grocery store: almonds, grapes, strawberries, walnuts, lettuce.*

Page 10: More Crop per Drop

- Activity – Three Irrigation Types
  Answers from left to right: Surface, Sprinkler, Micro

Page 12: Good, Clean Water

- Activity: Farm Wastewater Treatment/City Wastewater Treatment
  Possible Venn Diagram-

<u>Farm Wastewater</u>	<u>Similarities</u>	<u>City Wastewater</u>
Tail water recovery system	Filtration system	Sewer system
Drainage water collected	Remove sediment	Wastewater treatment plant
	Remove plant nutrients	Large debris removed
		Addition of chlorine, UV light, microfiltration

Page 13: Water is Energy

- Acre-foot Activity

1. How many gallons is this? We know that 325,851 gallons = 1 acre-foot so 325,851 gallons x 3,500,000 acre-feet of water = <u>1,140,478,500,000 or 1 trillion, 140 billion, 478 million, 500 thousand gallons!!</u>

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2. How many acre feet is this? We know one acre-foot fills an area 12 inches deep, but we require 42 inches deep, so divide 42 by 12 which equals 3.5. 3.5 acre-feet x 325,851 gallons/acre-feet = 1,140,478.5 gallons. How many gallons to grow two acres of your favorite fruit? 1,140,478.5 x 2 = 2,280,957 gallons
3. How many acre-feet of water does a family of six use in a year? Since a family of 4 uses one acre-foot per year, find out how many acre-feet per person. Each person would use ¼ acre-foot per year. Multiply ¼ x 6 = 1.5 acre-feet used per year for a family of 6.
   How many gallons is this? Multiply 1.5 acre-feet/gallon x 325,851 gallons = 488,776.5 or 488,777 gallons

- How does hydroelectric power work?
  Reservoir-stores water
  Penstock-carries water from the dam to the turbines
  Turbine-blades are turned by the force of the water coming down the penstock
  Generator-generates electricity when rotated by the spinning turbines
  Powerlines-conduct electricity from the power plant to homes, farms, and businesses.
  Outflow- water that flows through the dam and power plant is returned to the river.

Page 14: How Would You vote?

- Proposition 1: PASSED

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