

Lesson 4: Watering Your Plants

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Lesson Snapshot

*Moon
Munchies*

Overview

Big Idea: Systems have parts that work together to accomplish a goal.

Teacher's Note: Big ideas should be made explicit to students by writing them on the board and/or reading them aloud.

Purpose of Lesson: This lesson requires that students sketch a diagram and build a watering system.

Lesson Duration: One hour.

Activity Highlights

Engagement: The teacher provides a cup of water to each student and asks questions. Students complete a worksheet.

Exploration: The teacher guides students through a booklet about water. Students read, discuss and illustrate. Students observe a plumbing system under a sink. The teacher provides materials for students to explore and create a watering system for the lunar plant growth chambers.

Explanation: Students verbally explain whether their systems work. The teacher asks students questions about watering systems and the importance of conserving water on the moon.

Extension: Students sketch and label a diagram of a watering system. Students build a watering system.

Evaluation: Rubrics guide and assess:

- Diagram of watering system.
- Student watering systems.

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Lesson 4: Overview

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Lesson Duration

- One hour.

Standards/Benchmarks

Technology: Standards for Technological Literacy (STL) (ITEA, 2000/2002)

- Students will develop an understanding of the core concepts of technology. (ITEA/STL 2)
 - Systems have parts or components that work together to accomplish a goal. (ITEA/STL 2B)
- Students will develop an understanding of engineering design. (ITEA/STL 9)
 - Expressing ideas to others verbally and through sketches and models is an important part of the design process. (ITEA/STL 9B)
- Students will develop the abilities to use and maintain technological products and systems. (ITEA/STL-12)
 - Use hand tools correctly and safely and be able to name them correctly. (ITEA/STL 12 B)

Science: Benchmarks for Science Literacy (AAAS, 1993)

- Tools are used to do things better or more easily and to do some things that could not otherwise be done at all. In technology, tools are used to observe, measure and make things. (AAAS 3A)
- Tools are used to help make things, and some things cannot be made at all without tools. Each kind of tool has a special purpose. (AAAS 8B)
- Most things are made of parts. (AAAS 11A)
- Something may not work if some of its parts are missing. (AAAS 11A)
- When parts are put together, they can do things that they couldn't do by themselves. (AAAS 11A)
- Make something out of paper, cardboard, wood, plastic, metal or existing objects that can actually be used to perform a task. (AAAS 12C)
- Use hammers, screwdrivers, clamps, rulers, scissors and hand lenses and operate ordinary audio equipment. (AAAS 12C)
- Draw pictures that correctly portray at least some features of the thing being described. (AAAS 12D)

English Language Arts: Standards for the English Language Arts (NCTE, 1996)

- Students read a wide range of print and non-print texts to build an understanding of texts, of themselves and of the cultures of the United States and the world; to acquire new information; to respond to the needs and demands of society and the workplace; and for personal fulfillment. Among these texts are fiction and nonfiction, classic and contemporary works.
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge.
- Students employ a wide range of strategies as they write and use different writing process elements appropriately to communicate with different audiences for a variety of purposes.
- Students adjust their use of spoken, written and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes.
- Students use spoken, written and visual language to accomplish their own purposes. (e.g., for learning, enjoyment, persuasion and the exchange of information).

Learning Objectives

Students will learn to:

- Identify and describe a system.
- Identify and describe parts that are needed to create a watering system.
- Express their ideas by sketching a diagram of a watering system.

Student Assessment Tools and/or Methods

1. Rubric for Diagram of Watering System

Category	Below Target – 0	At Target – 1	Above Target – 2
Diagram	Few pictures are accurately drawn, with few or no details.	Most pictures are accurately drawn, with some details.	All pictures are accurately drawn, with many details.
Sequence	Most parts are connected out of sequence.	Most parts are connected in the correct sequence.	All parts are connected in the correct sequence.
Labels	Few labels are correct, with few or no details.	Most labels are correct, with some details.	All labels are correct, with many details.
Neatness	Diagram is not neat. A small amount of text is neat. There are many visible stray marks and/or smears.	Diagram is neat. Most text is neat. There are few visible stray marks and/or smears.	Diagram is neat. All text is neat. There are no visible stray marks and/or smears.
Spelling	Many words are misspelled.	Most words are spelled correctly.	All words are spelled correctly.
Teacher Comment			

2. Rubric for Watering System

Category	Below Target – 0	At Target – 1	Above Target – 2
Parts	Some parts are missing. Parts are not securely attached.	Most parts are included. Most parts are attached securely.	All parts are included. Everything is securely fastened.
System	System doesn't work. Most parts are connected out of sequence and placed incorrectly.	System is working, but occasionally the water does not flow easily.	System is working properly.
Teacher Comment			

Resource Materials

Print Materials

1. Cooper, J. (1992). *Science secrets water*. Vero Beach, FL: Rourke Corp.
2. Hooper, M. (1998). *The drop in my drink*. New York: Viking.

3. Nelson, R. (2003). *Where is water?* Minneapolis, MN: Lerner.

Audiovisual Materials

1. Giakoumis, H. (Producer), & Jacobs, L. (Director). (1995). *The magic school bus at the waterworks* (Video). U.S.A.: Scholastic Productions.
2. Rodney-Pex, D. & Satage, R. (1993). *Murky water caper* (Video). America's Clean Water Foundation – 1-800-4-PLANET.

Internet Sites

1. *Local hazardous waste management program in king county*. (October 12, 2006). Retrieved April 14, 2007 from <http://www.govlink.org/hazwaste/house/yard/watering.html>
2. *Natural yard care: Practice smart watering for healthier plants*. Retrieved April 14, 2007 from <http://www.govlink.org/hazwaste/house/yard/watering.html>
3. Sample, S. (NASA Official). (October 10, 2006). *Droplet and the water cycle*. Retrieved April 14, 2007 from <http://kids.earth.nasa.gov/droplet.html>

Required Knowledge and Skills

1. Students should be able to identify how they get water in their homes/school.
2. Students should have an understanding that water is essential for all living things on Earth (plants, animals and humans).

Lesson 4: 5-E Lesson Plan

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Engagement

1. The teacher gives each child a cup of water. The teacher asks the following questions.
 - What is in your cup?
 - Where did I get the water?
 - How did it get there?
 - Where does water come from each day?
 - What are some ways you use water?
 - Why is water important to us?
 - What other things need water to survive?
2. Students drink their water.
3. Students complete the worksheet, About Water (*Watering Your Plants 1*). The teacher allows students time to share their responses. The teacher may record responses on a chart

Exploration

1. The teacher provides each student with a copy of the booklet, Water (*Watering Your Plants 2*). The students read page 1, discuss the information on the page and draw a picture. The teacher guides the students through each page in the same manner, allowing time for the students to cut their pages out and staple the booklets.

The teacher asks the following questions:

- Where can we find water?
 - How do plants get water?
 - Where do people get water for indoor plants?
2. The teacher allows students to look at the plumbing system under a sink.
 - The teacher asks students to explain what they see.
 - The teacher discusses the term “system.” (A system is something that has many parts or components that work together to accomplish a goal.)

The teacher asks students the following question:

- What parts make up this plumbing system?
3. The teacher gives each student a syringe, a piece of tubing 5 inches long, a plastic container and a small amount of water.

The teacher asks the following questions:

- What objects have I given to you?
 - Do any of these objects represent the plumbing system we saw?
 - What do you think we could create with all of these parts that would help plants to grow?
4. The teacher explains to the students that the plastic container will be the “pot” to hold the seeds that will be planted in their lunar plant growth chamber.

- The teacher allows time for the students to create a watering system. The teacher can refer to the *Photographic Overview of Unit* for instructions on how to complete a watering system.

The teacher walks around and asks the following questions:

- Why do you think your watering system does/does not work?
 - Why did you decide to put your “pipe” there?
 - Is it better to have your “pipe” at the top, middle or bottom of your pot? Why?
- Once the students have had enough time exploring and manipulating their objects, the teacher asks the following questions:
 - When your water comes out of your “pipe,” what do you notice?
 - When people use a water hose, what allows the water to spray in various directions?
 - Why do you think it is important to have water spray in various directions?
 - What can you do to your “pipe” so that the water doesn’t fall into one spot?
 - The teacher allows time for the students to work on their “pipe.”
 - Students explore new terms and concepts by reading selected books and listening to the teacher read.
 - Students explore new terms and concepts by viewing selected videos.
 - Students explore new terms and concepts by viewing selected Internet sites.

Explanation

- Students explain verbally why they think the system does/does not work.
- Students explain verbally their answers to the following questions:
 - Why do you think a watering system is needed in your lunar plant growth chamber?
 - Why do you think astronauts would need to conserve water?

Extension

- Students sketch and label a diagram of a watering system. (Worksheet 3 in the *Engineering Portfolio and Journal*.)
- Students build a watering system.

Evaluation

Rubrics guide and assess:

- Student diagrams of a watering system.
- Student watering systems.
- Worksheet 3 in *Engineering Portfolio and Journal*.

Enrichment

- Students can write a poem about water.
- Students can create a poster about water—where we get it; why water is important; ways to conserve it. The teacher allows students to share their knowledge with others.
- Students can sketch and label Earth’s water cycle. Information could be included about why this cycle could not happen on the moon.

Lesson 4: Lesson Preparation

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Teacher Planning

1. Make copies of Engineering Worksheet 3 (*Engineering Portfolio and Journal*).
2. Make copies of the worksheet About Water (*Watering Your Plants 1*).
3. Make copies of the booklet, Water (*Watering Your Plants 2*).
4. Make sure all of the tools/materials are available.
5. Provide areas where students can build a watering system.

Tools/Materials/Equipment

- Tubing
- Syringes
- Hammer and nail
(An alternative is any device that will pierce holes in the tubing so that water will spray out in various places.)
- Screws
- Paper
- Hole punch for paper or nail and hammer (An alternative is any device that will create a hole for the tubing to go through.)
- Cups
- Water
- Small plastic containers (Small plastic salad containers with hinge lids work well—cut off the top and use both the top and bottom; the containers for cereal that is sold in schools work well; and standard plant containers are another option.)
- Copies of the Engineering Worksheet 3 (*Engineering Portfolio and Journal*).
- Copies of About Water (*Watering Your Plants 1*).
- Copies of Water (*Watering Your Plants 2*).

Classroom Safety and Conduct

Students are expected to follow normal classroom and school safety rules.

Tool Safety Rules should be posted and reviewed:

1. Students should wear safety goggles at all times
2. Students should carefully watch what they are doing when using tools.
3. Students should make sure vises, clamps and miter boxes are fastened securely.
4. Students should check to make sure all tools are safe and should not use broken tools.

About Water

Name _____



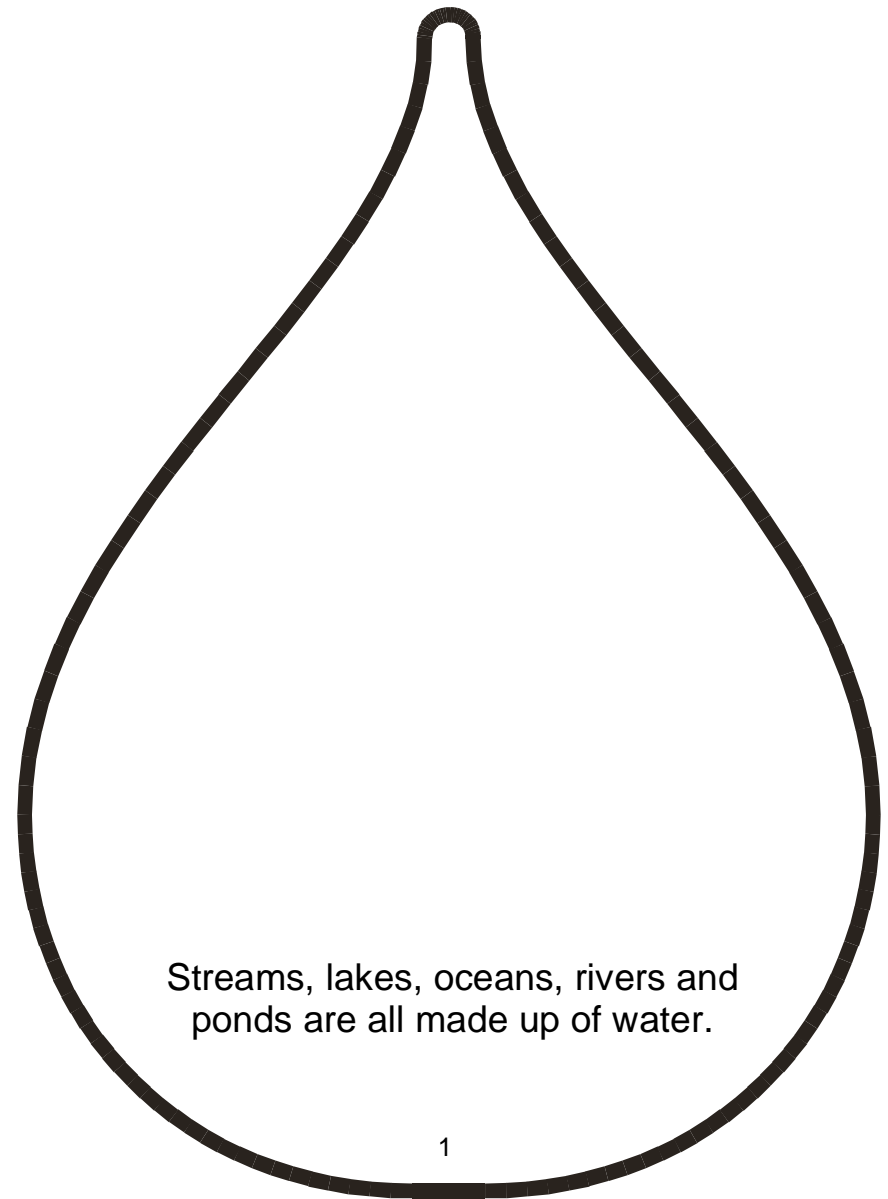
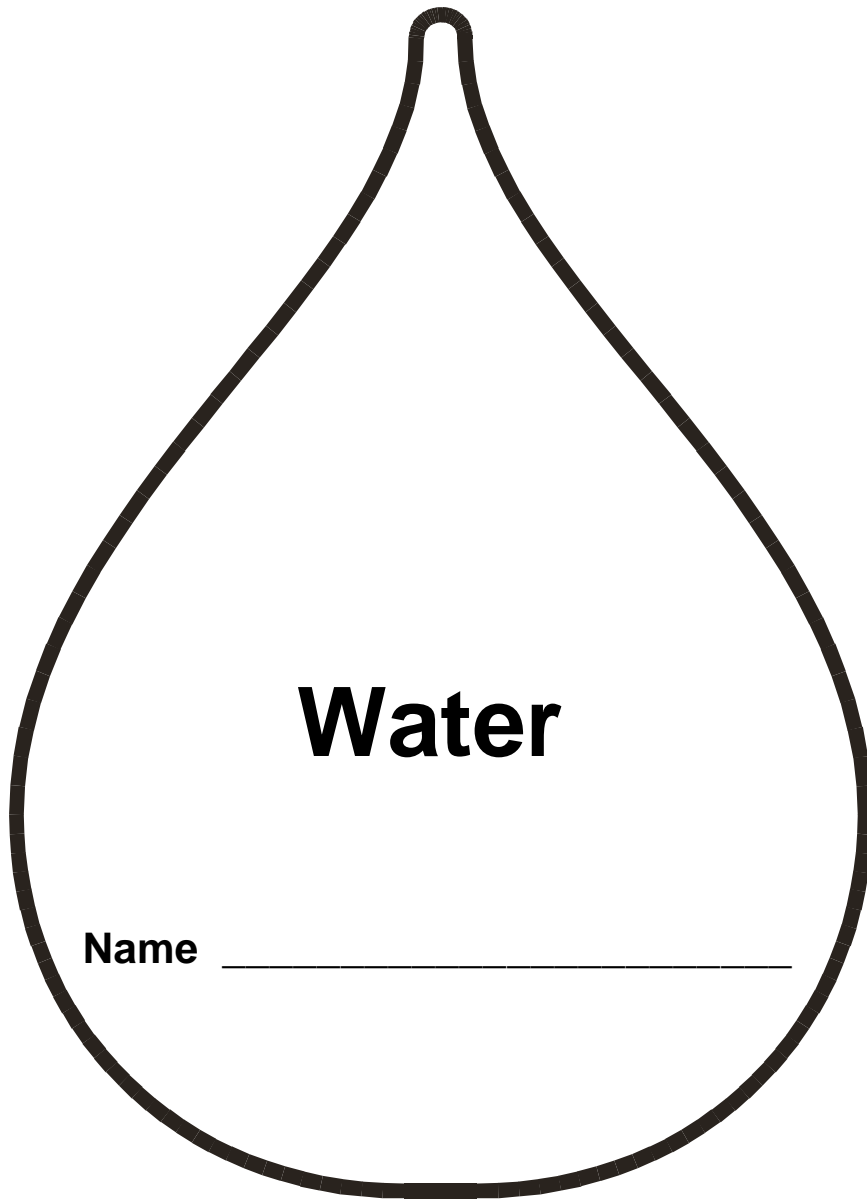
Where do you get water from each day?

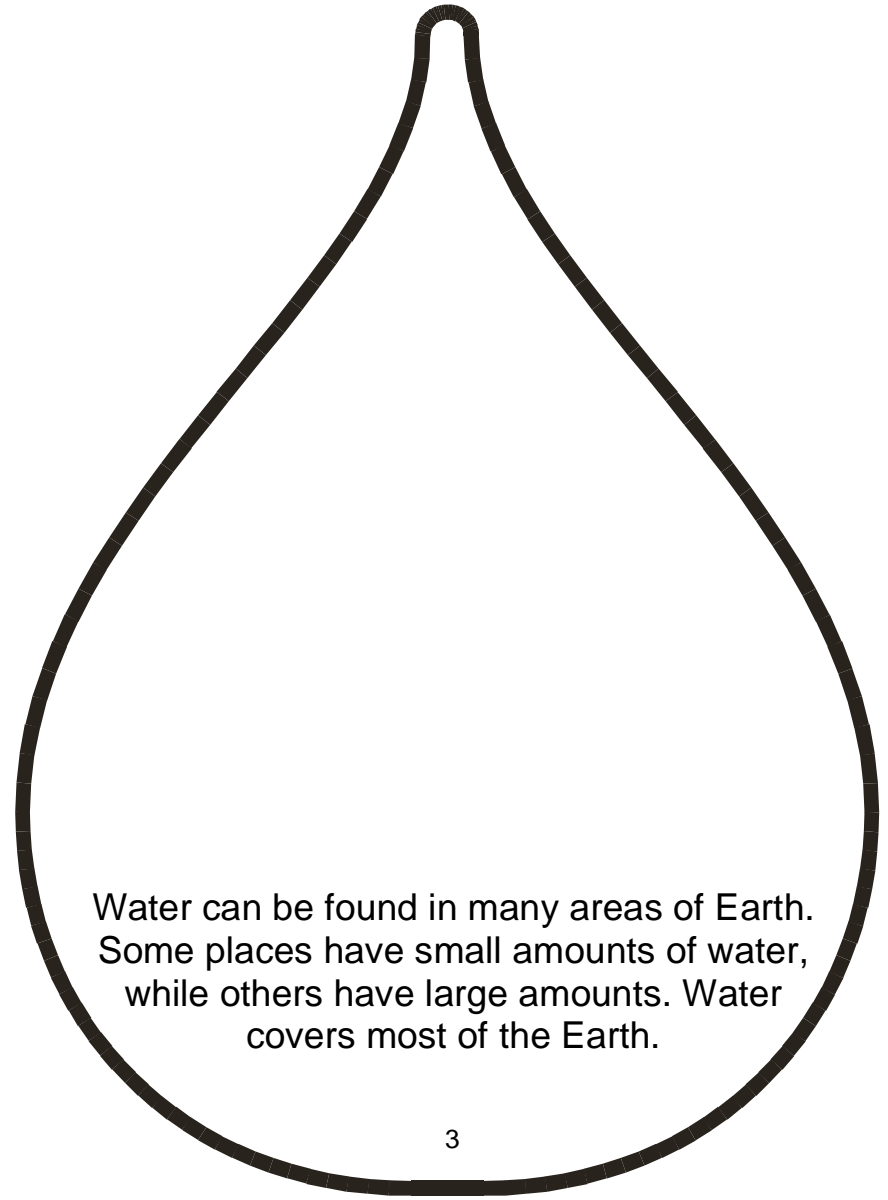
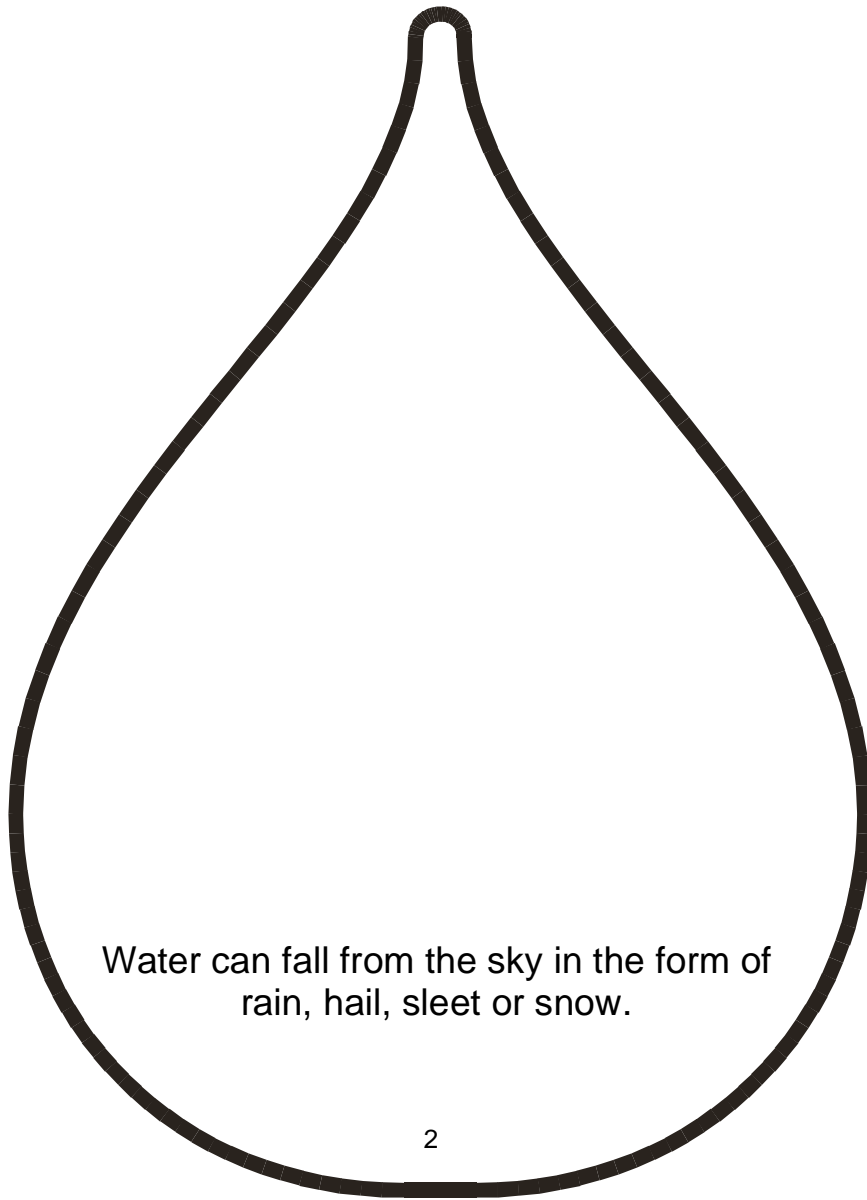
List three ways you use water.

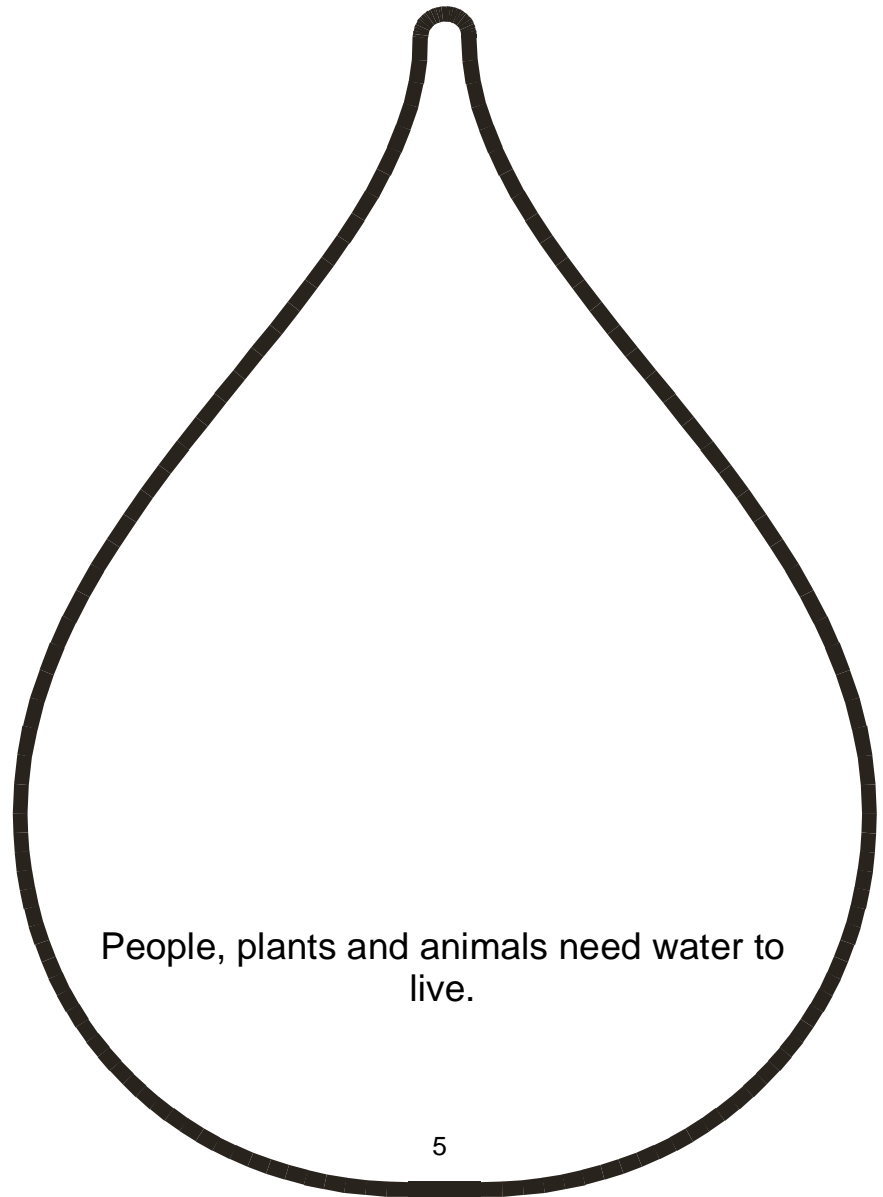
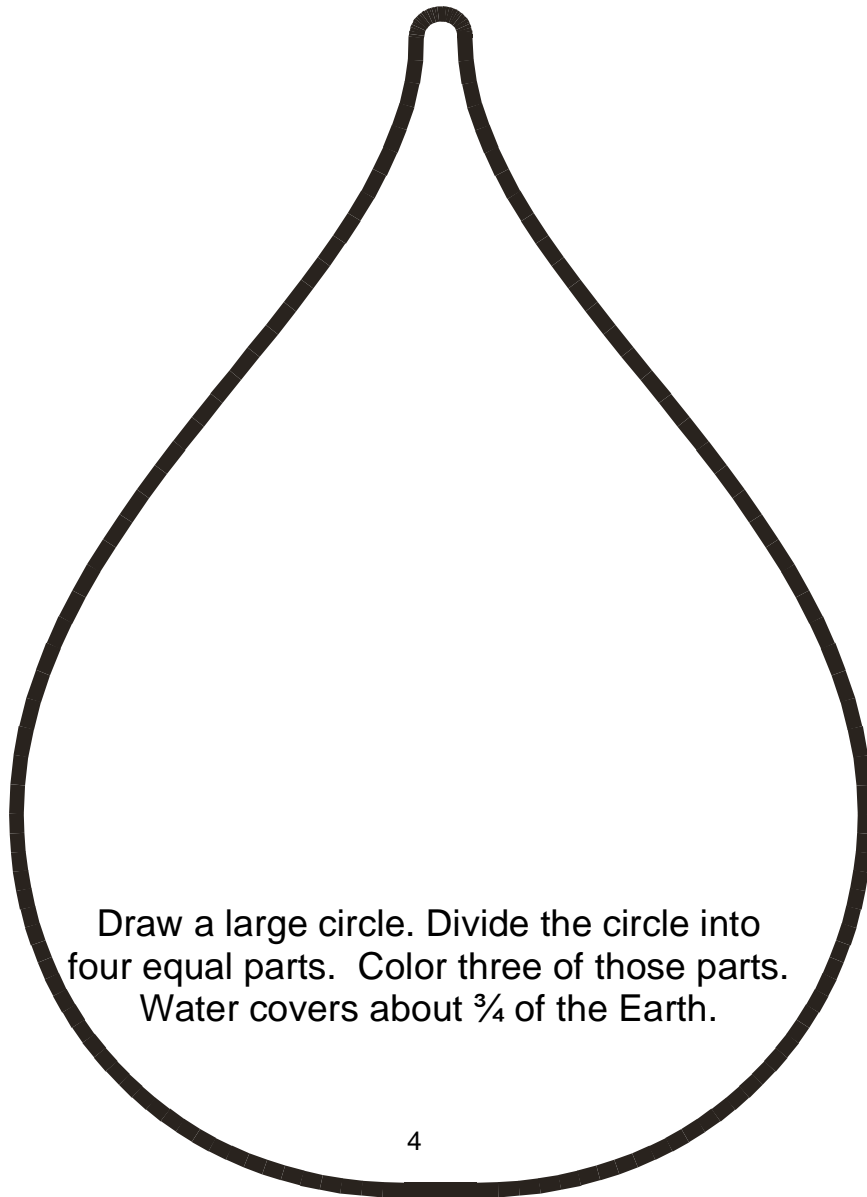
Why is water important to us?

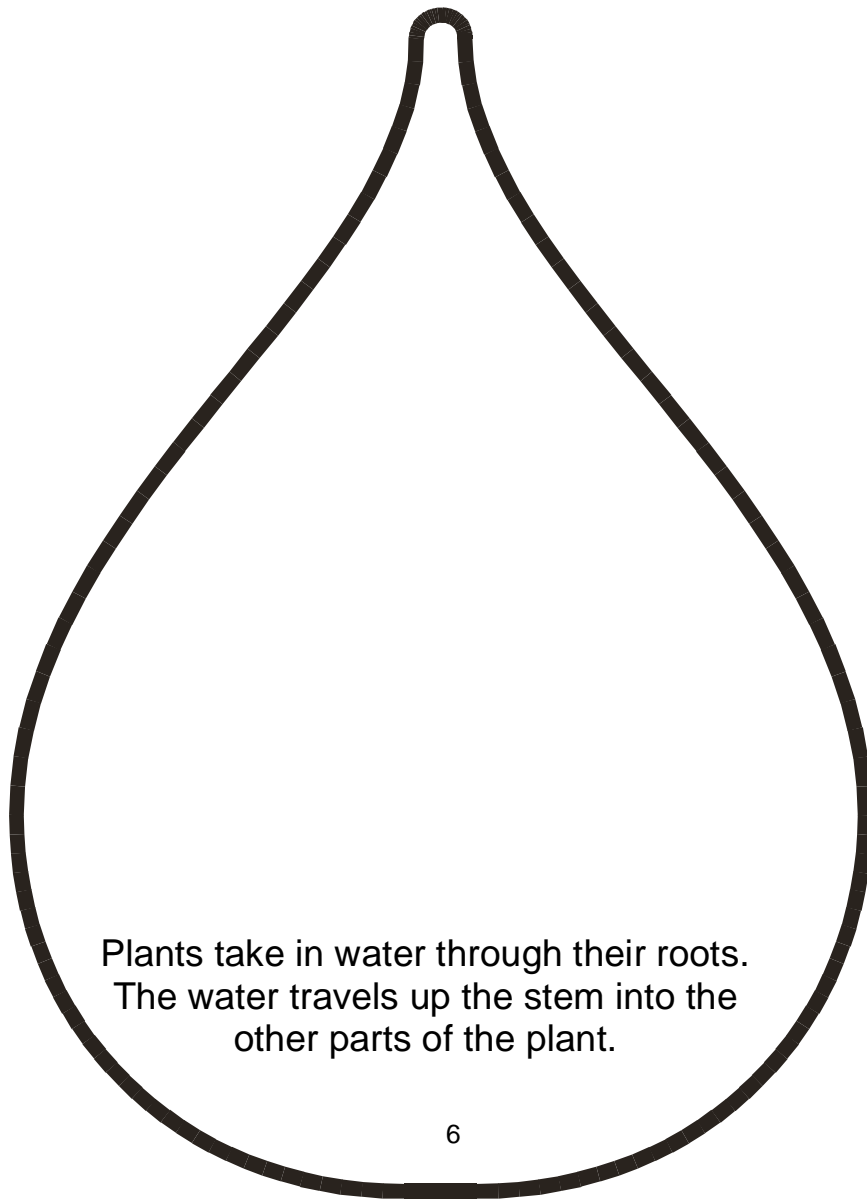
Why is water important to plants?

Illustrate one way you use water.



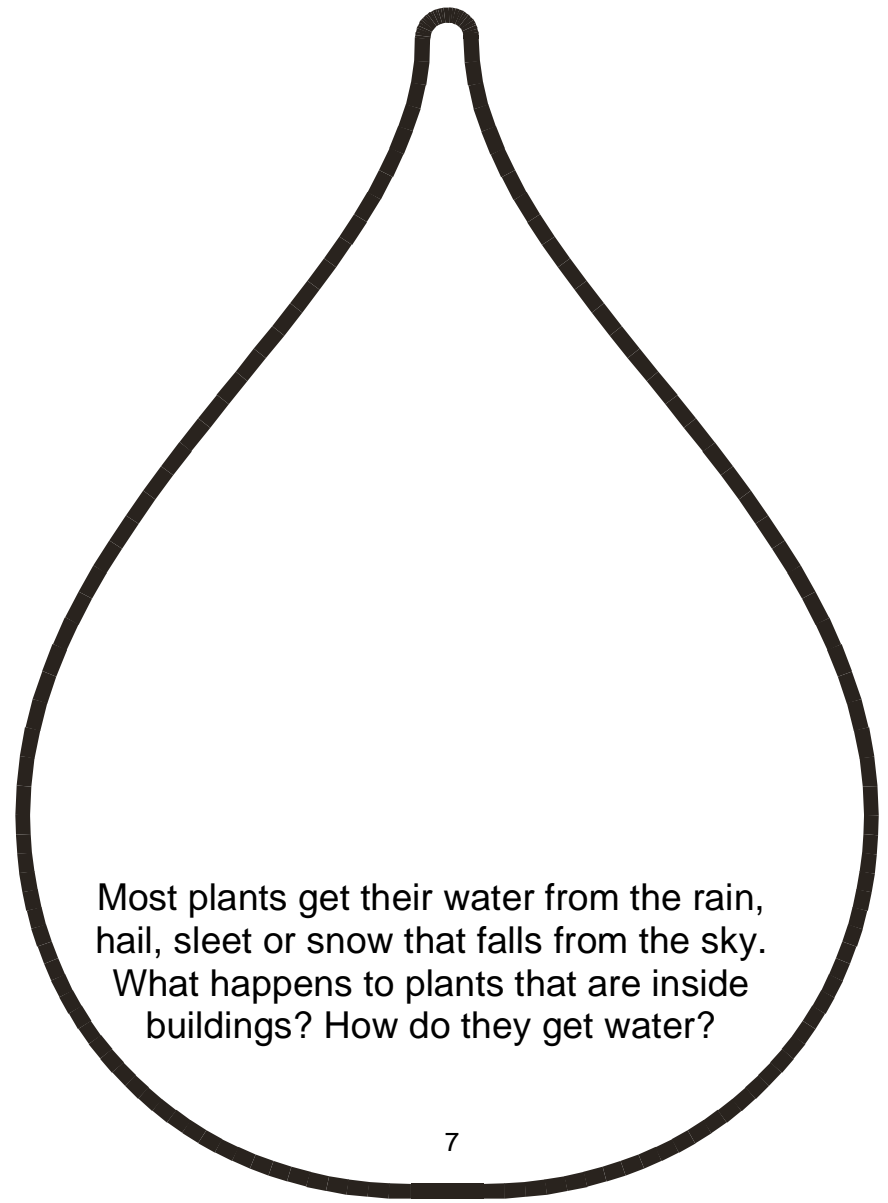






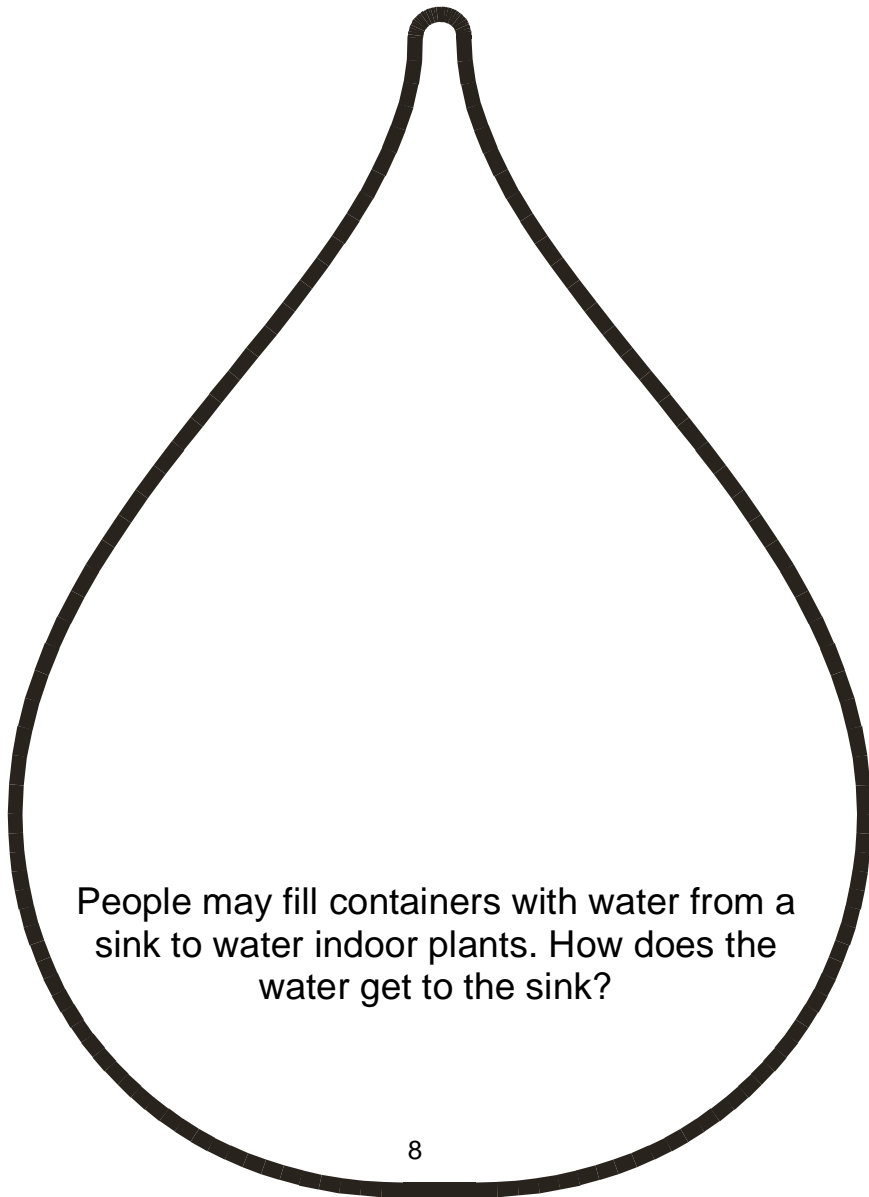
Plants take in water through their roots.
The water travels up the stem into the
other parts of the plant.

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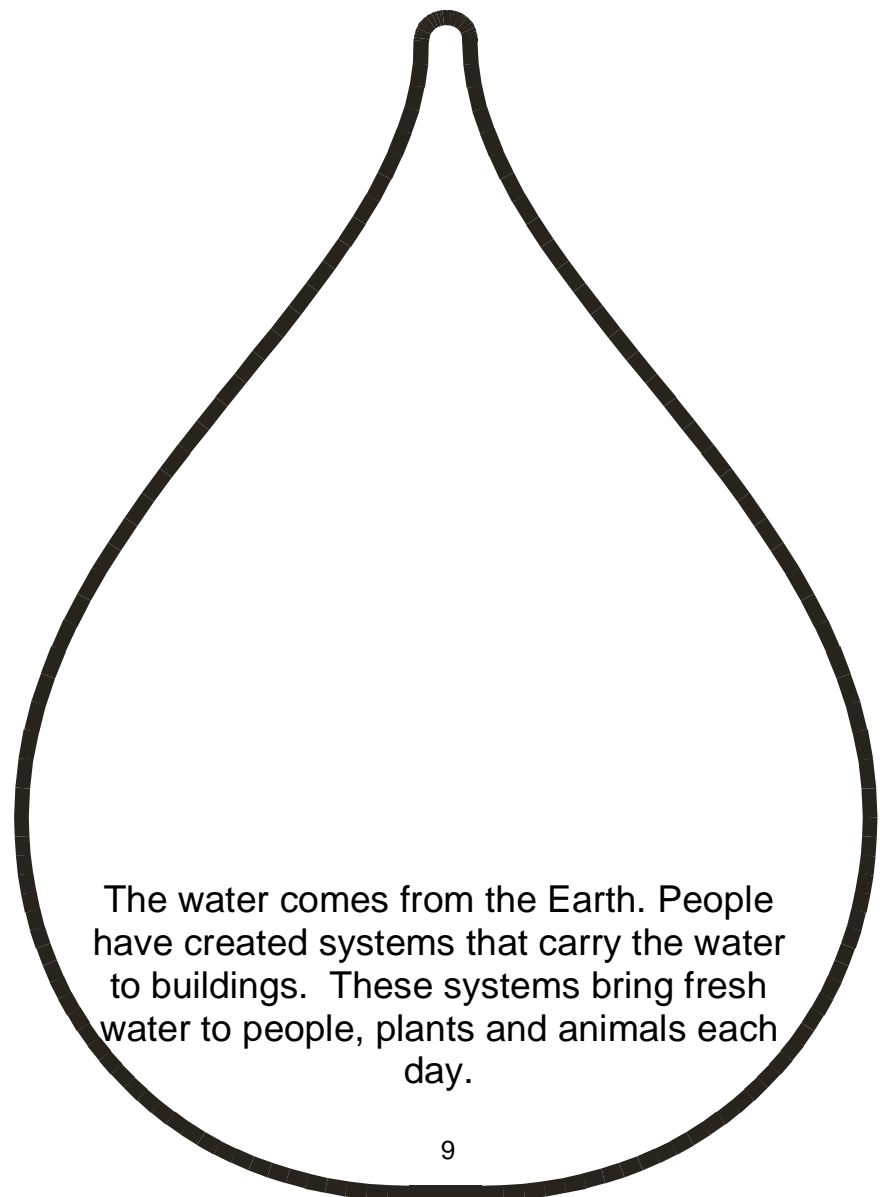
Most plants get their water from the rain,
hail, sleet or snow that falls from the sky.
What happens to plants that are inside
buildings? How do they get water?

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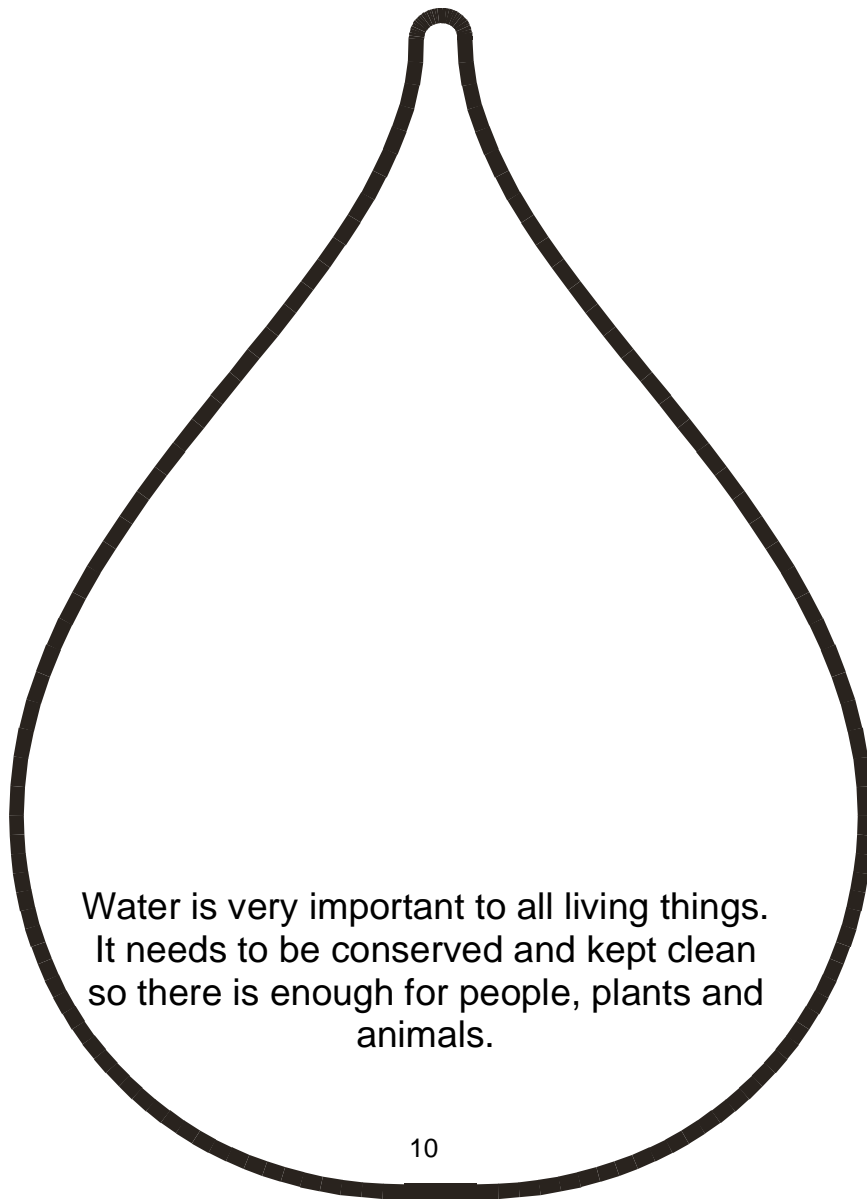
People may fill containers with water from a sink to water indoor plants. How does the water get to the sink?

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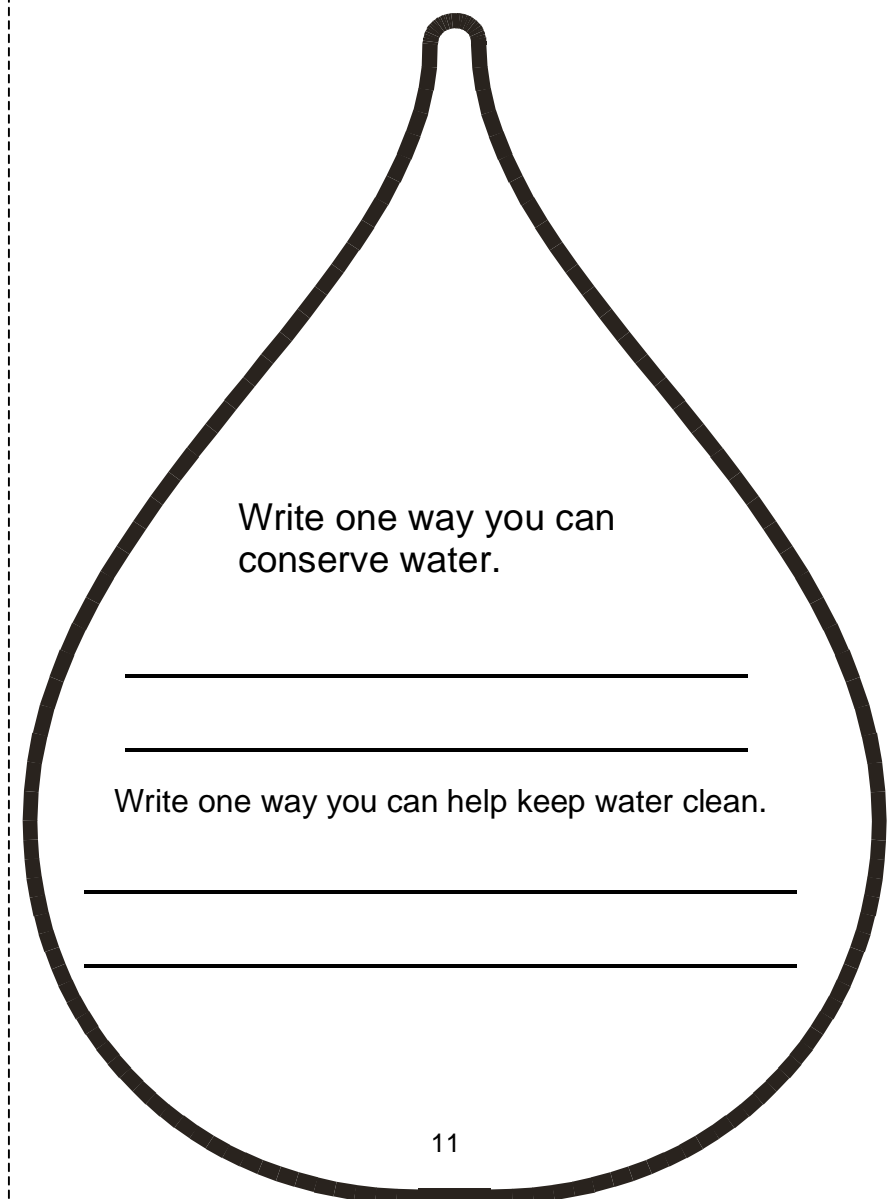
The water comes from the Earth. People have created systems that carry the water to buildings. These systems bring fresh water to people, plants and animals each day.

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Water is very important to all living things.
It needs to be conserved and kept clean
so there is enough for people, plants and
animals.

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Write one way you can
conserve water.

Write one way you can help keep water clean.

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