

WATERDROPS

Groundwater

Teacher's Guide

Welcome to the groundwater issue of WaterDrops! As part of the Splash! Water Resources Education program, the Southwest Florida Water Management District (SWFWMD) offers this water resources newsletter for elementary students. The newsletter is correlated to grades 3–5 of the Sunshine State Standards and provides an interesting way for students to increase their awareness and respect for our precious water resources. To better prepare your students for testing, we have included WaterDrops Challenge, which contains items similar to those that may appear on the Florida Comprehensive Assessment Test (FCAT).

This issue of WaterDrops focuses on groundwater. It includes fiction, nonfiction, writing, drawing and problem-solving activities, games and websites to explore. All information and activities are designed to teach students about groundwater. Let WaterDrops make a splash in your classroom today!

Many other free materials are available from the SWFWMD and can be ordered online at WaterMatters.org/Publications/. Please contact us if you have any questions or suggestions about our water resources education programs.

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Hello Readers!

Groundwater lies beneath the surface of the earth and is an important part of Florida's water supply. Precipitation gradually soaks into the ground, percolating down into areas called *aquifers*. For additional background information on groundwater, visit the website presented on page 8 of the newsletter.

Sunshine State Standards: SC.D.1.2.4, SC.D.1.2.5

Page 1

Water Drips & Drops

It's fun to learn facts about our water. Aquifers are mostly limestone. Water moves freely through the holes in this spongelike rock. Wells are drilled into the aquifer so pumps can draw the groundwater to the surface. Wells, which may exist in different shapes and sizes, supply water to cities, homes, farms and other locations. Ask students if they are familiar with any aquifers in Florida.

Sunshine State Standards: SC.A.1.2.4, SC.D.1.2.4

Pages 2 & 3

Feature Story

Read the story together. On a map, ask students to locate the land area that covers the Floridan aquifer system. Emphasize the facts associated with the Floridan aquifer system. Ask students to imagine what it would be like to be inside the aquifer. Be sure to caution the students about the potential dangers of cave diving. Then ask students to complete the writing activity.

Sunshine State Standards: LA.A.2.2.5, LA.B.2.2.3, LA.B.2.2.6, SC.A.1.2.4, SC.D.1.2.4, SC.G.2.2.2, SS.B.1.2.1

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Take It Home

Prepare your students for the activity they will do at home. You may want to perform a demonstration of the experiment in the classroom. Make sure students have all the materials for completing the experiment at home. Ask students to read the directions for making a sinkhole and encourage them to try the experiment. Ask students to share their notes and draw conclusions about what they learned about sinkholes.

Sunshine State Standards: SC.D.1.2.4, SC.D.1.2.5, SC.H.1.2.5, VA.A.1.2.1

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Ask Water Cycle Wanda

Ask students if they have ever seen a spring or a sinkhole. Then select two students to play the roles of Wally and Water Cycle Wanda. Ask the students to read their parts. For an additional activity, ask students to draw a picture or make a model of karst terrain.

Sunshine State Standards: SC.D.1.2.4, SC.D.1.2.5, SC.H.2.2.1

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Discuss the terms and their different characteristics with your students. Then ask students to complete the activity.

Sunshine State Standards: SC.D.1.2.4, SS.B.1.2.1

Discuss the concept of pollution with your students. Read about how pollutants affect the quality of our groundwater. Then ask students to complete the sentences at the bottom of the page.

Fill in the Blank Answer Key: unhealthy (dirty, unclean, etc.), we (humans, people), stormwater

Sunshine State Standards: SC.D.2.2.1, SC.G.2.2.1

Word Search Answer Key:



Water Words Answer Key: karst, sinkhole, sponge, aquifer, limestone, springs

Surf the following website for additional information about groundwater.

GroundWater.org

Discuss the importance of protecting our groundwater. Then ask students to decode the hidden message. This closing activity can be submitted by an individual student or as a classroom set.

Answer: The Floridan aquifer system contains our precious drinking water.

WATERDROPS Extended Activities

(See Page 3 of this Teacher's Guide)

Number 1: A Toast to Water!

This activity can be done in a group setting. Try to find the source of drinking water at your school.

Number 2: Letter to the Editor

Use a real newspaper to show examples of letters to the editor. You may decide to write a letter as a group activity.

Number 3: Percolating in the Ground

Discuss the information presented on page 5 of the newsletter before doing the activity.

Number 4: Pollution Bumper Sticker

Brainstorm with your class for a list of messages that could be used on bumper stickers.

WATERDROPS Challenge

(See Page 7 of this Teacher's Guide)

Answers to multiple-choice items: 1-b, 2-c, 3-a, 4-d

Answers to extended-response items:

Question 1. Responses will vary. Students should be able to provide a general description of an aquifer and include facts presented in the feature story.

Score 2 points if. . . . The student provided a general description of the aquifer and included facts about the feature story. The student's response was accurate and complete.

Score 1 point if. . . . The student provided a partial description of the aquifer and included some facts about the feature story. The student's response includes information that is essentially correct, but the information is too general or too simplistic.

Score 0 points if. . . . The response is inaccurate, confused, and/or irrelevant.

Question 2. Responses will vary. Students should be able to demonstrate an understanding of ways people can take personal responsibility for helping to protect their groundwater.

Score 2 points if. . . . The response indicates the student understands how people can take personal responsibility for helping to protect their groundwater. The student has provided a response that is accurate and complete.

Score 1 point if. . . . The response indicates the student partially understands how people can take personal responsibility for helping to protect their groundwater. The student has provided a response that includes information that is essentially correct, but the information is too general or too simplistic.

Score 0 points if. . . . The response is inaccurate, confused, and/or irrelevant.

Sunshine State Standards: LA.A.2.2.5, LA.B.2.2.3, LA.B.2.2.6, SC.D.2.2.1, SC.G.2.2.1



A Toast to Water!

The tap water and bottled water we drink can come from many places. These sources may include lakes, rivers, streams, ponds, reservoirs, springs or aquifers. Water that contains a lot of minerals may taste different from your tap water at home. Distilled water, which has had the minerals removed, may taste different from your school's drinking fountain water.

Try this experiment to help you decide which water tastes best to you. Then make a toast to water!

Materials:

- 1 container of mineral water
- 1 container of distilled water
- 1 container of tap water
- 1 container of filtered tap water
- paper cups

Directions:

1. Label the bottom of each paper cup "mineral," "distilled," "tap" or "filtered" water.
2. Pour water from each container into its matching cup.
3. Taste the water from each cup and record your comments on the chart below.
4. Now, mix up the cups and don't peek at the labels.
5. Pick up one cup and taste the water. Describe the taste. Then look at the chart to find out which type of water matches your first description. Check the label under the cup. Is it the same?
6. Repeat step 5 for the other cups of water.
7. Answer the questions below.

A Toast to Water		
<i>Type of Water</i>	<i>Description of First Taste</i>	<i>Second Taste</i>
Mineral Water		
Distilled Water		
Tap Water		
Filtered Water		

Think About It

1. Which water tasted the best to you? Which water did you like the least?
2. What kind of water do you usually drink at home?
3. What kind of water do you usually drink at school?
4. Were your descriptions the same for your first taste and second taste?

WATERDROPS Extended Activity Number 3

Percolating in the Ground

You learned there is a lot of water action taking place under the earth's surface. When water falls to the surface, it often seeps into underground areas. This action is called *percolation*.

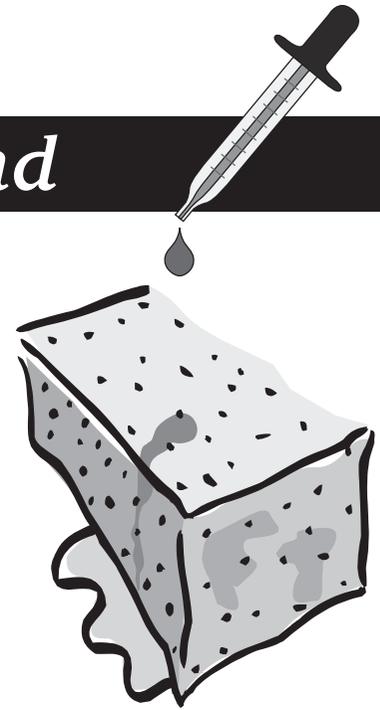
In this activity, you will make a model that shows how water percolates deep into the ground. It's fun!

Materials:

- very thick sponge
- permanent colored markers
- water
- food coloring, various colors
- paper cups
- eye dropper

Directions:

1. Study the picture on page 5 of the newsletter. Use the picture for your model.
2. Using markers, draw areas on the sponge to show sections under the earth's surface. Be sure to label the bottom area "Aquifer."
3. Pour water into a paper cup and mix in some blue food coloring. Use an eye dropper and drip some water on different areas. This water represents water from rainfalls.
4. Pour water into another paper cup and mix in some red food coloring. This water represents materials that can cause water to become polluted. Use an eye dropper and drip water on different areas.
5. Other colors can be used to represent wells and springs.



Extra Challenge

Take your model home. Then use the model to describe to your family how water moves beneath the earth's surface.

Pollution Bumper Sticker

You learned in the newsletter that many kinds of materials can cause our groundwater to become unhealthy. A few examples of materials that can be pollutants are pesticides, batteries, fertilizers, oil, gasoline, materials from septic tanks, litter, household chemicals, and so on. People should use these materials in safe ways that don't hurt the environment. Often people need to be reminded how important it is to keep our environment clean and healthy. One way to do this is to remind them with a bumper sticker!



For this activity, create a bumper sticker that could be displayed on your family car or truck. The bumper sticker will remind people to help protect our environment.

What message will be on the bumper sticker?

What things will you draw on the bumper sticker?

What colors will you use so people will clearly see your bumper sticker?

WATERDROPS Challenge

Directions:

Let's see how much you have learned about groundwater. Do your best and meet the challenge!

Choose the best answer.

1. Groundwater lies almost everywhere beneath the earth's surface. Most of Florida's drinking water comes from aquifers. What is an aquifer?
 - a. a natural opening in the earth's surface where water flows
 - b. an underground area of spongelike rock that holds water
 - c. a lake, river or stream
 - d. a sinkhole
2. All of the following are true statements about the Floridan aquifer system EXCEPT one. Which one does NOT belong in the list?
 - a. It is the largest and deepest aquifer system in Florida.
 - b. It stretches 100,000 square miles.
 - c. It is made up mostly of lemonstone.
 - d. It stores groundwater that is used for drinking water.
3. Materials that are pollutants can cause our groundwater to become unhealthy. Which of the following is NOT an example of a pollutant?
 - a. drinking water
 - b. septic tank seepage
 - c. pesticides
 - d. fertilizers
4. A karst landform often has springs and sinkholes. What causes a sinkhole to form?
 - a. Water from abandoned wells seeps into the ground causing a space.
 - b. Stormwater runoff creates an underground space near the bedrock.
 - c. A hole drilled into the aquifer causes water to flow out of a natural opening in the earth's surface.
 - d. Underground bedrock erodes and dissolves from acidic water, leaving an underground space.

