WELLS: SOLVING THE GROUNDWATER PROBLEM

Objectives:
The student will be able to:

- Discover and explain how a well works;
- Examine a well's relationship to the water table.

Suggested Grade Level:
6-8

Subjects:
Science, Language Arts

Time:
Approximately 30 minutes

Materials:
- 2-liter soda bottle
- gravel
- sand
- pump from the top of a soap dispenser or spray container
- blue food coloring
- three paper cups
- markers

B A C K G R O U N D I N F O R M A T I O N

About half of the U.S. population gets its drinking water from the groundwater. There are about 12 million individual wells and around 50,000 community-owned groundwater systems. Wells allow us to get to and use water that is stored under ground.

A well is a hole in the ground that reaches into the groundwater. In ancient days, these wells were dug by hand and lined with stones or bricks to prevent the sides from collapsing. Today, most are formed by drilling a 4-6 inch hole (private well) or 24-36 inch hole (utility well) and lining it with metal or plastic piping.

A well must be dug deeper than the water table (top surface of the saturated zone). Water is usually pumped by hand, windmill, or motor-driven (electric- or fuel-powered) devices.

T E R M S

ground water: water found beneath the ground
saturated: holding as much water as possible
water table: top surface of the saturated zone that holds the water

A D V A N C E P R E P A R A T I O N

A. Prepare a model for a well demonstration.
1. Cut the top off a 2-liter soda bottle.
2. Fill the bottom with gravel. Gravel can be purchased in the pet section of many department stores.
3. Locate a pump from the top of a soap dispenser.

P R O C E D U R E

I. Setting the stage

A. Show students a picture of a well and a water tower. Ask students what water towers and wells have in common? (*Focus on the fact that both need*

to lift water upwards and therefore need a pump to move water against gravity.)

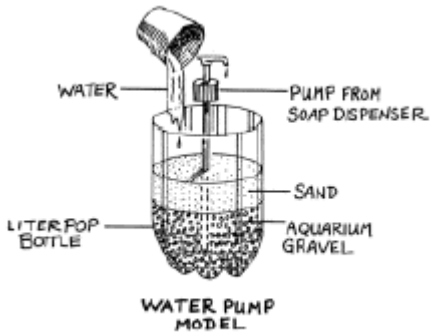
B. Explain what is really important about wells today. About half of the U.S. population gets its drinking water from wells. While most wells are safe, the potential exists for their contamination or pollution.

II. Activity

A. Place the demonstration material where all students can observe. Explain that you are about to demonstrate how a well works.

1. Using the 2-liter bottle, fill with 3 to 4 inches (7.5 to 10 cm) of gravel and sand. *(See the illustration below.)*

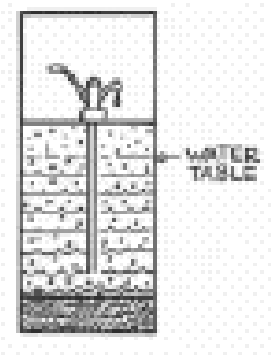
2. Pour in 2 to 3 inches (5 to 7.5 cm) of water colored blue with food coloring.
   a. Tell the students that water found beneath the ground is called groundwater.
   b. Explain that the top surface of the saturated zone that holds the water is called the water table. Mark the water table with the marker.
   c. Place the pump into the gravel with the tube extending into the water.
   d. Tell students that today, a well is usually drilled. It is around 2 to 4 inches (5 to 10 cm) wide and lined with a metal or plastic pipe. Why do you think it needs to be lined? *(to keep the dirt/sides from falling in)*
   e. Ask the students to notice that for the well to work, the tubing must extend below the water table.



WATER PUMP MODEL

3. Pump water out of the model *(catching the water in the cup).*
   a. Ask "When we take water out of the ground, what happens to the water table?" (*It goes down*.) Mark this level with a marker of a different color.
   b. Ask the students how water gets back into the groundwater supply. *(when it rains, etc.)* Ask a volunteer to demonstrate the action of precipitation and how it affects the groundwater by pouring more of

the blue water back in until the original water table level is restored. (This is called "recharge.") Remind students that some groundwater sources cannot be replenished because they are sealed both above and below by solid rock or another ground material that will not let water soak down.



(NOTE: This model can also be used to demonstrate the concepts presented in the activity "Well, Well, Well" located on page F.6 of this book.

III. Follow-Up

A. Have the students draw a cross-section of a well and the water table. Instruct students to write one sentence that describes how a well affects the water table.

IV. Extensions

A. Have students contact their local health department for guidelines on digging new wells.

B. Have students research legends, folklore, and superstition about wells.

R E S O U R C E S

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Korab, H., Land and Water: Conserving Natural Resources in Illinois, University of Illinois at Urbana-Champaign, Champaign, Illinois, 1989.

Nickson, Pat, Sandcastle Moats and Petunia Hotbeds: A Book About Groundwater, Virginia Polytechnic Institute and State University, Blacksburg, Virginia, 1989.

Thank you to the Environmental Protection Agency *Water Sourcebook* for this activity!
http://water.epa.gov/learn/kids/drinkingwater/wsb_index.cfm