# Wells and the Water Table

**Skill: Science**

## Objectives

Students will:

- Understand groundwater, what it is and where it comes from.
- Understand the relationship between a well and the water table.

## Background

If you fill a clear plastic cup with some small gravel, then simulate rain by pouring or sprinkling in a couple of ounces of water, you will see the water drip down through the gravel until most of it ends up in the bottom of the cup. Water held in the ground is called "groundwater." The gravel flooded with water is called the "saturated zone" because the gravel is saturated with water -- all the spaces between the chunks are filled.

In the upper layer, water "sticks" to the surface of the gravel chunks, but the spaces between are filled with air rather than water. The top layer is called the "unsaturated zone." (Sometimes it is called the zone of aeration; "aer" is pronounced just like "air.") Air is what fills the spaces between the pieces of gravel in the unsaturated zone.

The "water table" is the top surface of the saturated zone. The water table separates the saturated zone from the unsaturated zone. The saturated zone is where the groundwater is located.

Water moves in to fill any open spaces below the water table. If a well pumps out some of the water, nearby groundwater will move in to fill the spaces.

Groundwater is removed and used by making a "well." But how did groundwater get in the well in the first place?

When you put a soda straw into a cup of cola and ice, the cola will fill the straw below the "water table." The soda straw was like an open space in the cola's "saturated zone." If you sip some of the cola from the straw, the cola outside the straw flows through the ice chunks into the straw to replace the cola you drank. If you wait between sips, you can watch the soda fill the straw (below the water table) again. A well works along the same lines. An electric motor is usually used to withdraw the water out of the ground.

A well, like a soda straw, leaves an open space for liquid to flow into. In the ground, a well acts like an open space in the saturated zone. Water from the surrounding rocks will keep on flowing into that "open space" as long as the water table is higher than the well's intake area.

You can demonstrate this by putting a spray pump into the cup of gravel below the "water table." Each time you pump water out of the well, you leave space for the surrounding water to flow into.



## Vocabulary

- simulate
- groundwater
- saturated zone
- unsaturated zone
- aeration
- water table
- well
- surrounding

## Materials

- 1 clear plastic cup
- Small amount of gravel (3/4 cup)
- Water (approximately 2/3 cup)
- Spray pump (similar to a liquid handsoap bottle)

## P.A.S.S.

### 4th Grade

- Read 1.1, 3.1b
- Write 1.2

### Science

- Process 3.1,3, 4.4, 5.4

### 5th Grade

- Read 1.1a, 3.1b
- Write 1.2

### Science

- Process 3.1,3, 4.4, 5.4

### 6th Grade

- Read 1.1a, 3.1b
- Write 2.7

### Science

- Process 3.1,5, 4.1, 5.4
- Earth/Space 5.1,2

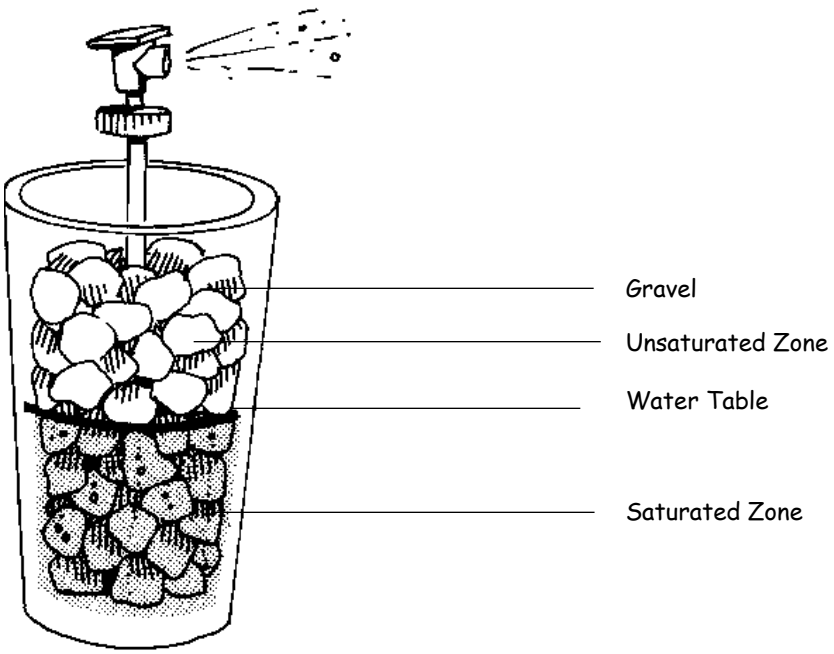
# Wells and the Water Table

**Read and discuss backround and vocabulary.**

**Procedure**

- Fill the plastic cup three quarters full of gravel as shown in illustration No. 1.
- Add water until the cup is half full.
- Observe the water as it travels through the gravel. When does it stop flowing through gravel?
- Have students draw a picture of the cup and the gravel after the water has been added. Label the saturated and unsaturated zones.
- Label the water table on the drawing.
- Insert a liquid soap bottle spray pump into the glass with the bottom well into the saturated zone. Pump the sprayer. What happens to the water?
- What happens to the water level if you keep pumping? (Hint: In nature when water is pumped out of the ground other groundwater seeps in to take its place; if there is groundwater in the area.)
- This same principle is used with wells for people's homes.

Write a paragraph to explain your drawing. Explain how a "well" remains full of water.




**No. 1 Simulating a water well**

Adapted with permission from Sandcastle Moats and Petunia Bed Holes, Virginia Water Resources Research Center, Kathy Sevebeck, Program Director, George V. Wills, Illustrator, and New Hampshire's Water Resources, Cooperative Extension Service, University of New Hampshire, Durham, NH.