



## Classroom Activity on Ground Water Movement

# Where do mountain raindrops go?

### Materials

- Cross sectional U.S. Geological Survey poster of ground water and the water cycle ("Ground Water the Hidden Resource"; limited hardcopies available through U.S. Geological Survey, or at <http://water.usgs.gov/outreach/OutReach.html>).
- Samples of cracked rock, gravel and sand.

### Teacher Preparation

This activity can be conducted in the classroom, gymnasium, or outside the school building. This is a demonstration that may create some excitement.

### Procedure

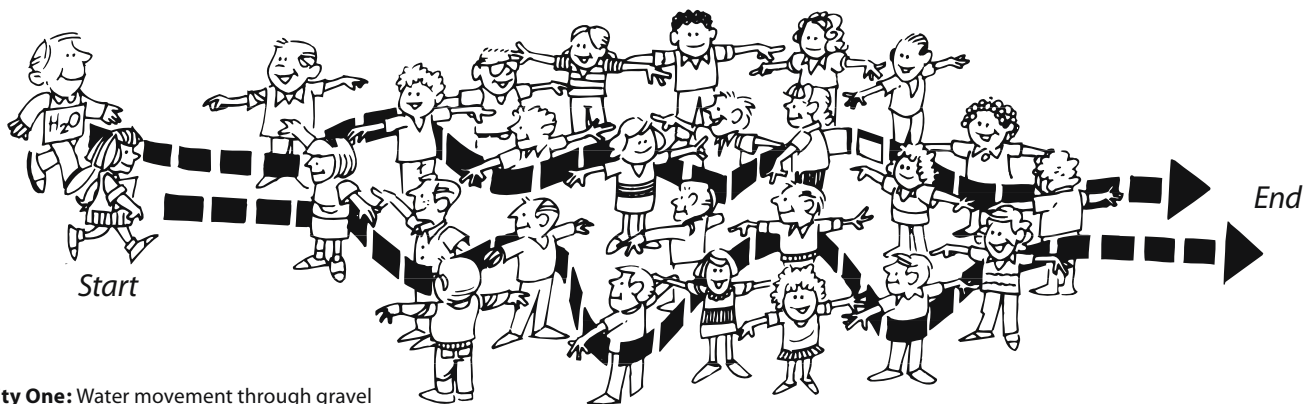
Select two or three students to be molecules of water. Three other students will be earth "movers, shakers, and breakers" - one student to be "dynamite," (earthquake), "ice thawing," and "freezing." The remaining students will be rock materials.

### Activity One: Water movement through gravel

The students represent gravel by holding arms outstretched, leaving a 6 to 12 inch (15-30 centimeters) space between their outstretched arms. Locate these students in the center of the activity area. The students representing water molecules are to start on one side of their "gravel" classmates and move through them, exiting on the other side. The water molecules will move easily through the gravel.

### Activity Two: Water movement through sand

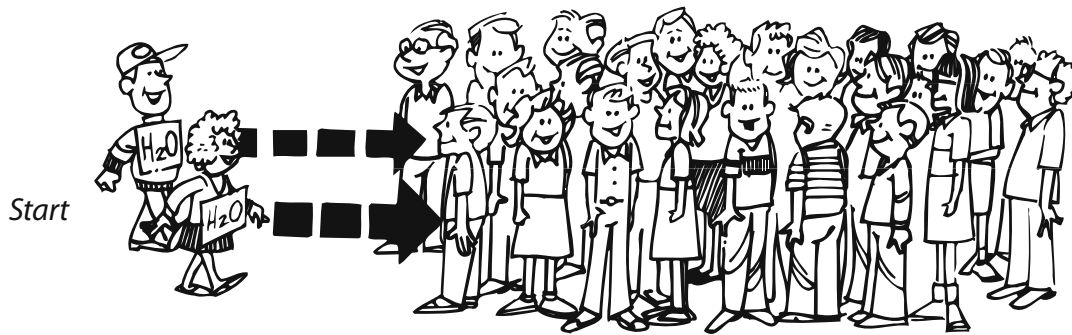
The students represent sand by extending arms, bending them at the elbows and touching their waists with their fingers. Locate these students in the center of the activity area, spacing them approximately 6 inches (15 centimeters) apart. Once again, have the water molecules slowly make their way through their "sand" classmates. The water molecules will experience some difficulty, but should still reach the other side.



Activity One: Water movement through gravel



Activity Two: Water movement through sand



**Activity Three:** Water movement blocked by impermeable rock

### Activity Three: Water movement blocked by impermeable rock

Students represent impermeable rock by holding their arms by their sides and standing closely together. Water molecules are blocked/stopped by impermeable rock. Ground water cannot flow through unfractured rocks.

Identify one student as “fault,” another as “pressure,” and a third as “ice freezing and thawing.” Each of these students will touch the arm of a student who represents unfractured rock. When touched the rock will “crack” and the water molecules will make their way through.

In order to create a fracture for water to flow through, students will touch the unfractured impermeable rock and these students, when cracked, will link arms to represent a fracture for the molecules to flow through. Water will move very slowly through this type of system.

### Discuss

1. Ask students if they know what ground water is, and what it flows through.
2. Put the word “aquifer” on the board and ask students if anyone knows what the word means. Then put the Latin derivation on the board so they can see the parts of the word and how we arrived at its definition.
3. Discuss the importance of ground water: It is a plentiful source of fresh water. About half of the people in the U.S. use ground water as their source of drinking water. Almost all people in rural areas use ground water (wells). It is also used for about 40% of irrigation of crops, so it is vital for agriculture.
4. Discuss how water flows through different sediments, show samples of sand, gravel, and fractured rock.
5. Have kids perform ground water activity.

### Ask Questions to Stimulate Critical Thinking

- A. Which one of the materials, gravel, sand or fractured rock, was the easiest for the water molecules to move through? (*Gravel*)
- B. If there were three rock units, one gravel, one sand, one fractured rock, all containing the same quantity of water, which would you want to drill into and why? (*Gravel, because ground water moves the easiest through this medium.*)
- C. Where does ground water come from? (*Precipitation, and from water bodies if ground water surface is connected and below that of a stream, river or lake. Remind them of the water cycle.*)
- D. What would happen in the student’s neighborhood if a well was drilled near the stream and lowered the water table near the stream? (*Lakes could eventually go dry.*)
- E. Next, discuss the issue of how ground water can become contaminated. (*There are many sources: septic tanks, underground gas tanks, feedlots, hazardous waste, landfills and many more.*)

### Follow-Up Activities

Several follow-up activities have been created for use as homework, or for independent classroom work. Here is the list of activities that are included in the student packet:

- Draw a Well and Septic
- Investigate Your Home Well and Septic System
- Word Search Puzzle
- Crossword Puzzle
- Water Maze and the Wild Raindrop Race