

WHERE DOES THE WATER GO?

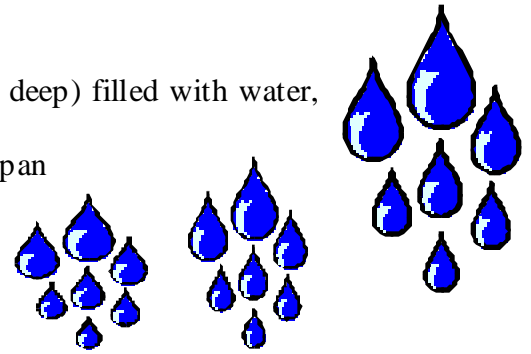
Objectives:

Students will:

- demonstrate that water will follow cracks in the bedrock as it travels underground
- determine how cave passages form along cracks in the bedrock.

Materials:

- Large, flat Tupperware™ container (at least 3 inches deep) filled with water, then frozen
- Cookie sheet (with raised edges) or brownie/lasagna pan
- Hammer or rock
- Hot water



Procedure:

1. Turn the Tupperware container upside down and empty the block of ice onto the cookie sheet.
2. Tell the class that the block of ice represents limestone.
3. Hit the block of ice once or twice with the hammer. What happens? Ask the class how limestone might become cracked in the natural world. Discuss cracking due to uplift and major earthquakes.
4. Review with the students where rainwater can go once it hits the ground. (Some will evaporate, some will run along the surface into watersheds, and some will seep into the ground.) What happens to the water when it seeps through the soil? Review carbonic acid formation. What happens when this carbonic acid reaches the bedrock? Review the concept of limestone dissolution.
5. How do the students think the carbonic acid will travel through the limestone? What route will it take? Use the cracked ice as an example. The acidic water should flow preferentially through the cracks.
6. Raise one end of the cookie sheet and support it with a book. Pour hot water over the ice at the high end. Where does the water go? How does it travel? Watch as the water dissolves the ice, just as carbonic acid dissolves limestone. The resulting “cave” passages are formed along the pre-existing cracks. In the earth, does the water enter only from the high end of the rock? Chances are the water will drain over the earth equally as though the water was being poured over the top of the whole ice sheet. Raising the sheet represents a hill or mountain area where water will flow at the top and collect at the bottom, or the valley.
7. Discuss how caves form in the natural world. There are several kinds of formation processes: stream erosion, lava tubes, sea caves, ice caves, acid formed caves, etc. What types of caves will form in extensively cracked limestone? What is an example of this? (Wind Cave is an excellent example being 95 miles long (January 2001) under only one square mile of surface).