Alejandro's Gift

(GPN #113/PBS #1108)

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Program Description: In the feature book, Alejandro's gift was water that he gave to thirsty desert animals. In a desert, water can be difficult to find. Alejandro found it underground using a well. Fortunately for LeVar, when his jeep overheats in this episode, he finds water at an oasis, where he meets with a park naturalist and learns more about the oasis and the native people who once lived there.

Tea Time

Key Words: water, solvent

Concept: Water can dissolve some materials.

One of the interesting properties of water is that it is a terrific solvent — many things can be dissolved in water. We make use of this property every day when we drink juice, tea, or soda. All of these drinks are mostly water. Each one has different substances dissolved in the water that give it a distinct taste. Long before there were grocery stores, people made their own teas from native plants. They probably soaked the plants in hot water or used the sun to make "sun tea."

Materials: Large glass jar with a lid, water, herbal tea bags, large plastic spoon, drinking cups, sunlight.

1. Fill a large glass jar with cool water. Add 5 or 6 herbal tea bags. Put the lid on the jar and set the jar on a table or shelf in direct sunlight. Be sure to place the jar in a location where it is not likely to be bumped or knocked over.

2. Leave the jar in direct sunlight for several hours and have students describe changes to the water several times during that time.

3. After several hours, move the jar to a table where students are able to see it. Remove the tea bags using a large spoon. Explain that the water has changed color because substances from the tea bags have dissolved into the water.

4. Have students wash their hands and give each a small cup of tea from the jar to taste.

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Water We Don't See

Key Words: water, ground water, well, saturation, water table

Concept: Fresh water can be found underground.

When we think of fresh water, most of us think of rivers and lakes. But less than 1% of all the fresh water on Earth is found in rivers and lakes. Most of the fresh water (75%) is frozen in ice caps and glaciers. The second largest source is one we never see—about 24% of the Earth's fresh water is found underground. A well does not lead down to an underground lake or river but collects and stores ground water.

Materials: Clear 2-liter soda bottle, gravel, water, blue food coloring, pitcher.

1. Cut the top off of a clear 2-liter soda bottle. Fill the bottle with about 6 inches of clean gravel. Imagine that this is a cut-out model of the earth. By looking at the gravel through the sides of the bottle, you can get some ideas about what it is like underground.

2. Use your finger to draw a deep line in the surface of the gravel. This line represents a river bed. The line should be an inch or more deep. Add a bit more gravel to one side of the line to make a small hill.

3. Partially fill a pitcher with water. Add blue food coloring to the water.

4. Slowly pour a cup of the blue water into your river bed. Look at the side of the bottle. What happens to the water? (It drains down into the gravel.) This water is like ground water. Look for the top of the ground water. The top of the water is called the water table. Below the water table the gravel is saturated with water. This means that all the tiny spaces between the gravel are filled with water. What will happen to the water table if you pour in more water? (The water table will rise.)

5. Slowly pour in more water and wait for it to drain down. Watch what happens to the water table. Keep pouring in more water and waiting until the water table rises up to the level of the river bed. Try to add just enough water so that there is water in the river bed but not up over the hill. Where is most of the water in this model — underground or in the river? (Underground) What happens to the water table in a flood? (The water table rises up above the surface of the land.)

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Well Done

Key Words: water, ground water, well, saturation, water table

Concept: Ground water can be collected in wells.

Wells work by collecting ground water which can then be brought up to the surface using a pump or a bucket.

Materials: Bucket filled with 6 inches of gravel, 1-gallon container of water, empty juice can with one end removed, large spoon, knife, toy water pump (optional).

1. Make 2 or 3 rows of 1/2" slits around the bottom of a juice can using a knife. Wiggle the knife a bit to widen the slits.

2. Set a bucket filled with about six inches of gravel in a location where several students can see into it. Make a hole in the gravel that is about 2" across and about 2" deep. Slowly pour water into the hole. Add just enough water so that the water level rises into the hole but does not reach over the top of the gravel. Push gravel back into the hole. Ask students where the water went and where the water is now. (In the gravel, but below its surface.)

3. Let students use a spoon to dig in the gravel so that they can see and feel the water. Tell them this water is like ground water and that wells usually contain ground water.

4. Ask students to dig a hole in the gravel and stand the juice can into it so that the end with the slits is down. Have them push gravel in around the can until the gravel reaches just below the top of the can. Have them predict what might happen. (Water will drain into the can through the slits in the sides.)

If you have one available, students can use a toy water pump to pump the water up out of the juice-can well. Allow the water to flow out of the pump and back onto the surface of the gravel where it will drain down through the gravel to become ground water again. Ask them why a well might become dry. (Because of a decrease in ground water caused by overuse or drought.)

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Getting Pushed Around

Key Words: water, waterfalls, energy

Concept: Falling water is a source of energy.

Waterfalls, like Niagara, are a great source of energy. Just by looking at one you can get a feeling for all the power behind that falling water. Waterfalls are used to turn large wheels (turbines) which turn electrical generators. Try using falling water to turn a waterwheel.

Materials: Waxed paper, stapler, pencil, sink or other source of running water.

1. Tear off a 4" wide strip of waxed paper from a roll. Fold the strip in half the long way so that you now have a folded 2 " wide strip of waxed paper.

2. Starting at one end of the strip, fold it back and forth accordion style at 1" intervals until you reach the other end.

3. To make your folded strip into a waterwheel, bend the top accordion fold down and around to meet the bottom fold. Overlap these two folds and staple them together. Staple each of the remaining folds closed by placing a staple in each about 1/4" from the bottom. Each accordion fold is now a paddle for your waterwheel.

4. Place a pencil in the middle of the wheel. The pencil should fit loosely inside the waterwheel so that the wheel can turn easily around it.

5. Holding the two ends of the pencil, move the water wheel under a stream of water from a faucet so that just the front paddle touches the water. If your water wheel is working correctly, it should turn so fast that the paddles are a blur of movement. Now if you only had a generator!

Extension: Try making different sizes and kinds of waterwheels. Which ones are the best? What happens if the paddles are longer or shorter? What happens if you have fewer or more paddles?

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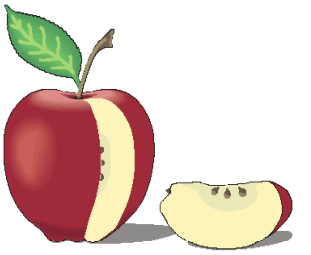
All Dried Up



Key Words: water, dehydration, evaporation

Concept: Water is contained in apples and many other foods.

All living things need water. But some animals, like the desert kangaroo rat, never drink water. Instead, they get all the water they need from the foods they eat and chemical reactions in their bodies. We can get some idea of how much water is in a food such as an apple by drying some. Drying food is the world's oldest method of food preservation. With most of the water removed, dried foods last longer without rotting, weigh less, and contain virtually all the nutrients of fresh foods.

Materials: Apples, knife, cookie sheet, small covered bowl, oven, potholder, napkins.

1. After having students wash their hands, help them peel and slice several apples. Try to make all the slices the same thickness—about 1/4 inch. Ask students to describe how the slices feel. Explain that the slices feel wet because apples contain water.

2. Have students arrange most of the apple slices on a cookie sheet. Place a few slices in a covered bowl and, if possible, refrigerate these slices.

3. Place the remaining apple slices on a cookie sheet in an oven. Set the oven heat for 150° F or at the lowest possible setting. Ask students to predict what the apples will be like after the water has evaporated.

4. So that the moisture evaporating from the apples can escape, leave the oven door ajar about an inch, by closing the door on a folded potholder.

5. The apple slices will be ready in 4 to 6 hours. However you will need to check them about every 30 to 60 minutes. Each time you do, remove the tray with the potholder and have students help turn the apple slices over. Then return the tray to the oven, being careful to prop the door open.
6. When the apple slices are done they will be leathery and soft, and, best of all, ready to eat. Before students eat them, have them compare the appearance and texture of the dried slices to the fresh slices set aside in the covered bowl. Why are the dried slices so much smaller? (The water has been removed from them.) Help students notice that the dried slices feel dry and much softer than the fresh slices. This is also because of the lack of water. It is water that gives the fresh apple slices their firm, crisp appearance. Let students compare the taste of both kinds of apple slices. With the water removed, the apple flavor is concentrated in the dried slices.

Extension: Try drying other fruits such as bananas or pineapple.

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