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# ACTIVITY

## 6

### THE GREAT SALINITY CONTEST! *OR WHO HAS THE SALTIEST AND THE FRESHEST WATER?*

**SCIENCE SKILLS:**

- observing
- measuring

**CONCEPTS:**

- Water containing dissolved salts is heavier (more dense) than fresh water.

**SAMPLE OBJECTIVES:**

- Students will be able to apply their knowledge about weight (density) of salt and fresh water to determine the relative salinity of unknown solutions.

**INTRODUCTION:**

This activity is a performance assessment of student learning during the previous five exercises. Now that your students have learned about the relationships of salinity and density, have them put their knowledge to work in a contest by discovering who has the saltiest and the freshest water samples. Students receive the samples at random, so the activity is a lottery of sorts. The prizes to the winners may be objects or rewards of special opportunities.

**MATERIALS:****For each student:**

- one sample jar of about a pint (in a plastic soft drink bottle, plastic peanut butter jar, or large paper or plastic cup)
- two small clear plastic cups
- a plastic spoon

**Shared by class:**

- volume measuring devices such as measuring cups or plastic graduated cylinders
- scales and/or balances
- food coloring in dropper bottles
- water samples of three different salinities: fresh water, water with salt at 1/4 cup per quart and water at 1/2 cup salt per quart (use kosher or canning salt, not table salt; see Recipes)
- prizes for the contest: stickers, a puzzle or maze, pencils, free time, anything that is small, but fun to win

**LESSON PLAN:**

**BEFORE CLASS:** Collect the containers for each student. (Students may have brought them from home.) Put a number on each jar. Fill each jar with one of the three solutions. Fill a few jars with fresh water. Most get the slightly salty solution. Fill one with the very salty water. Record which jars got which solutions so you know which wins. The saltiest wins the grand prize. The fresh water jars win second prizes. The rest lost in the lottery.

**DURING CLASS:**

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**METHODS:** Explain that now is the time to put what the students have learned about salinity and density or heaviness to work. Show them the jars. Each jar contains an unknown solution. Some hold fresh water, some slightly salty water, and one very salty water. Have them pick randomly among the jars. The students who picked the jars with fresh water get a prize. The person who picked the jar with the saltiest water wins the grand prize. It is like a lottery. But how do they know what they have? To discover who won, they have to test the solutions in the jars. Can they tell by looking? No. Then how?

There is one thing they cannot do: **DO NOT TASTE THEM!** Make sure students know that they should **NEVER** taste unknown solutions. Some kinds of salts are very toxic. They are not all like table salt. For example, Epsom salts can cause unpleasant diarrhea. Also, getting a fresh water sample from the sink is not legal! Students should plan how to test the solutions, using knowledge gained in previous exercises. Show them the array of equipment available to spark ideas. Have students fill out the worksheet with their plan before they begin. If they use up all their unknown before identifying it, they lose so careful planning is the key.

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**RESULTS:**

How are they going to find out who won? They can do any physical test which will get at the relationship of density or heaviness to salinity. They can check with you to find out if their results are accurate since you recorded which solution was in which sample bottle. Award the prizes when they have correctly found the fresh water and the saltiest water.

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**CONCLUSIONS:**

Have a brief class discussion of techniques used for testing. Which was best? Which was fastest?

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**USING YOUR CLASSROOM AQUARIUM:**

These fish can go in your aquarium. You can use fish from the aquarium with no ill effects if you use goldfish.

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**EXTENSIONS:**

How about asking the question: which is saltiest, the Dead Sea (276 gm of salt per kg of water) or the Great Salt Lake (266 gm salt per kg of water)? This can be solved in a number of ways. Everyone could compete to see who can dig the answer out of the library fastest. Or you could mix up two samples representing each using the information above and have the students test them. Locate each on the map.

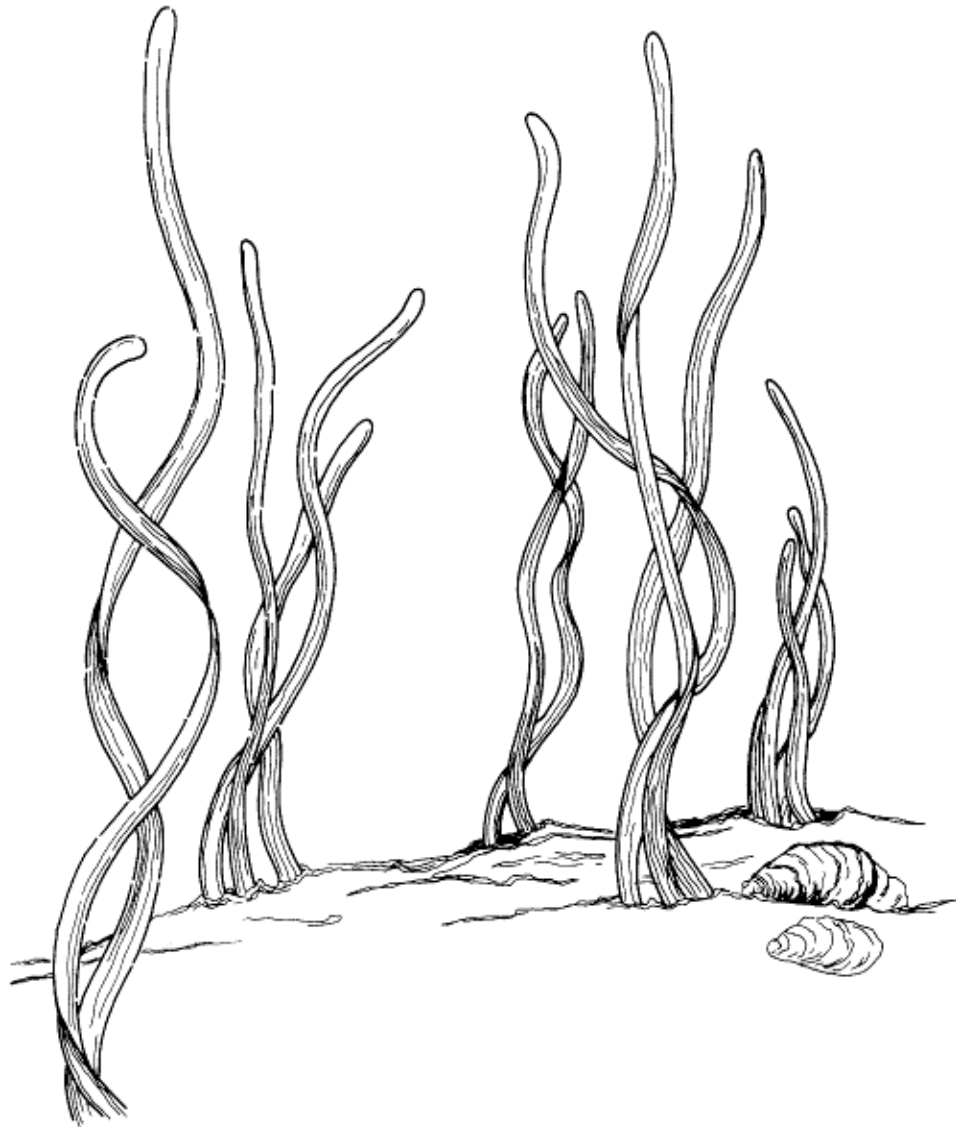
2. How do salt lakes form? Water flowing over the ground dissolves salts which are carried to a low spot from which there is no way for water to flow out. As the water evaporates, the salt is left behind.

3. Do salt lakes always stay the same? No! For the last several years the Great Salt Lake has had more water flowing in than has evaporated out. In 1986 the lake was rising fast. To prevent homes, roads and businesses from disappearing under water, Utah is talking about pumping water out of the valley where it is and into another desert valley.

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4. Can the students think of another habitat where salinity gets high? Tide pools can get very salty on a hot day during low tide! So do the pools of water in a salt marsh during low tide on a summer day. Salt marshes or ponds where there is restricted flow from the ocean and no rain or runoff of fresh water can also get saltier than the ocean. They are referred to as hypersaline.

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ACTIVITY 6

Name Possible answers

**THE GREAT SALINITY CONTEST!**

My sample number is 14

These are the steps I will take to determine if I have fresh water, slightly salty water or the very salty sample:

I think I will try weighing my water and see if it is heavier or lighter than someone else has. I might also use food coloring and compare it to other students' samples. I can also get fresh water from the tap for comparison.

I think my sample is  
     fresh water X slightly salty      very salty.

This is the evidence for my conclusion:

I lost. My water sank in tap water and floated on Linda's sample. When I weighed my sample, it weighed in between the heaviest and the lightest which were the fresh water and the very salty water.