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Spring, 2003

Exploring the Great Salt Lake

Abstract:

This lesson is an introductory lesson to a unit on the Great Salt Lake. Students will share what they know about the Great Salt Lake, visit the lake as a class, collect a sample of sand from the lake, and observe other characteristics and properties of the lake.

Grade Level: 2nd Grade, Range 1-3

Connections:

Core Curriculum

Standard 5: Students will analyze objects in terms of the materials of which they are made.

Objective 1 Compare and contrast objects that are made mostly of one kind of material.

Objective 2 Compare and contrast objects that are made of more than one kind of material.

Standard 6: Students will investigate changes in rocks.

Objective 1 Examine and discuss observable characteristics of rock.

Benchmarks

By the end of the 2nd grade, students should know that:

- People can often learn about things around them by just observing those things carefully, but sometimes they can learn more by doing something to the things and noting what happens.
- Tools such as thermometers, magnifiers, rulers, or balances often give more information about things than can be obtained by just observing things without their help.
- Describing things as accurately as possible is important in science because it enables people to compare their observations with those of others.
- When people give different descriptions of the same thing, it is usually a good idea to make some fresh observations instead of just arguing about who is right.

Time: In class discussion and web : 20 minutes, field trip: the field trip to the Great Salt Lake is either a day or a few hours, depending on the destination. Traveling to Black Rock is only about 20 minutes from Salt Lake City, whereas traveling to Antelope Island is over an hour. Facilitators should decide where to travel. However, if the class collects sand from Black Rock, someone else must collect sand from Antelope Island or vice versa. This way the students have two sand samples to compare and contrast. For this lesson, we will travel to Black Rock.

Key Terms:

Lake Bonneville: an ancient, giant lake that covered all of Utah and other surrounding states tens of thousands of years ago.

Great Salt Lake: the remnant of Lake Bonneville and the largest salt water lake in North America. No outlet rivers exist in the lake, making it up to eight times saltier than the ocean.

Oolitic sand: the unique type of sand found at the Great Salt Lake and made of mineralized brine shrimp waste and coated with calcium carbonate layers.

Intended Learning Outcomes:

Students will discuss what the Great Salt Lake sand is called.- Oolytic sand

Students will observe characteristics of the rocks at the Great Salt Lake.

Background Info:

The Great Salt Lake is what is left of the ancient Lake Bonneville that used to cover a lot of the state of Utah and parts of other surrounding states. Lake Bonneville drained and now the Great Salt Lake exists. The Great Salt Lake is eight times saltier than the ocean, but not as salty as the Dead Sea. The water flowing into the lake has no outlet, and this is what causes the mineral and salt build up.

The Great Salt Lake is a state park that is open all year round. At Antelope Island, there are modern restrooms, drinking water, and group pavilions that are available to the general public.

Materials

Each student will need:

Permission slips from parents, zip lock bag, science notebook, pencil or pen, colored pencils

Assessment of Prior Knowledge

Before the field trip, students will discuss what they know about the Great Salt Lake while in class. With teacher help, students will make a mind web on the board that shows what they know about the Great Salt Lake and all that pertains to it. This will show the teacher what the students know and what information to give them before the trip to the lake. At this time, key terms can also be shared and discussed.

Instructional Procedures

The main aspect of this lesson is a field trip to the Great Salt Lake. Students should be divided into small groups. While at the lake, each group will need to collect a sample of the oolytic sand. The sand will be used for comparison in a later lesson.

Also, each group will need to look at a variety of rocks to compare. Students will examine and discuss observable characteristics of rock.

- Collect a variety of rocks from different locations and record where they were found.
- Make a list of the different characteristics of collected rocks (e.g., hard vs. soft, shiny vs. dull, smooth vs. rough, single color vs. multi-colored).

- Make an illustration of a rock that shows two characteristics.

Discussion Questions (not mandatory)

Now that students have been to the lake, they can discuss it more fully. Ask them to do another web with you on the board. Students can now give more information about the Great Salt Lake from their observations.

Assessment Strategies

Throughout the trip, a lot of questioning and observation will be going on. The students will collect sand for later use. Also, they will make an illustration of the characteristics of a rock. This will be used as assessment to see if students understand what characteristics are and what characteristics rocks have.

Doing these activities will allow the students to make multiple observations and compare them with others. This will encourage them to make careful, detailed observations and learn how to compare and contrast these observations. Students will discuss the characteristics in class. Students will hand in their comparisons and be evaluated on criteria such as amount of detail, understanding of the similarities of rocks, understanding of the differences of rocks, and by presenting their findings to the class. They can do this by showing and talking about their drawings of the rocks.

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Studying the sand of the Great Salt Lake – Part two

Abstract: In this mini-unit the students will study two sands from two different parts of the Great Salt Lake: Oolytic sand from Antelope Island and the sand from Black Rock. The students will make observations using their senses as well as using technology. This lesson will be focused primarily on observing the sand with the naked eye and a few simple tools.

Level: Second Grade

Approximate length: 45 minutes

Utah State Core Objectives:

Objective 1-Compare and contrast objects that are made mostly of one kind of material.

- Describe the physical properties (e.g., weight, flexibility, texture, size, shape) of objects.

Objective - Compare and contrast objects that are made of more than one kind of material.

- Compare and contrast the effects of different physical manipulations on complex objects.

Background Information:

It is important to know that in the first part of this lesson the students went on a field trip to both Antelope Island as well as Black Rock. The students were able to compare the two ecosystems and gather samples of the sand found at both locations.

Antelope Island sand is what we call oolytic sand. The nucleus of this sand is brine shrimp "poop" surrounded by minerals. The oolitic sand at Antelope Island is very pure meaning there are not a lot of other rock particles that are mixed in with the sand. Because this type of sand has a chemical composition similar to that of baking soda, it has a similar reaction to vinegar or another type of acid.

Black Rock sand also has oolites in it. This sand, however, also has many particles of rock and other fragments mixed in with it. In other words this is not pure oolytic sand. There is more industry near Black Rock and more rock formations, which may contribute to the lack of pure oolytic sand in this area.

Important terms:

Measurement: The process of comparing a property of an object to a well-defined and agreed-upon referent.

Prediction: The making of a statement or forming of an opinion about what will happen in the future.

Observation: The attentive watching of somebody or something.

Terms taken from <http://www.school-for-champions.com/science/definitions.cfm>

Intended Learning Outcomes:

- Students will be able to describe differences in the two types of sand.
- Students will record differences and similarities about the two types of sand
- Students will make predictions or conjectures about the sand from the information gathered.

Materials Needed:

- Pure oolitic sand from Antelope Island
- Black Rock sand
- Petri dishes
- Measuring tools (tablespoons or other systems of measurement)
- A digital scale
- A microscope

Prior Knowledge Assessment:

To assess the prior knowledge of some of the ideas and terms mentioned above, do a class-wide KWL (know, want to know, learned) on the board. Use butcher paper to record ideas. Place it somewhere in the room so the students will be able to refer back to the chart. This activity will not only brainstorm ideas about what the students already know about the sand, it will also help generate questions to look for when observing the sand later on in the experiment.

Be sure to introduce the new vocabulary, measurement, prediction, and observation at this time.

Experiment:

1. To begin this portion of the lesson split the class up into groups of 3 or 4. There must not be more than 4 people in each group.
2. Pass out the samples of oolitic and black rock sand as well as the other materials.
3. Each group needs one microscope and one scale. It is all right to share these items as long as it is done in a centers fashion.
4. Ask the students to first observe each type of sand with their eyes. What do they see?
5. Have them record what they observe and then draw diagrams as well.
6. Have the students make any predictions about either sand at this time and be sure that they record everything. For example: Which sand do they predict will be heavier? How do they predict the sand will look under the microscope? This is a good time for the students to refer to the KWL class chart for some ideas on predictions.
7. Ask the students to measure the same amount of sand, for example two tablespoons.

8. Have the students weigh each sample and record their data.
9. Students should refer back to their previous predictions and see if any of their new data either supports or goes against their predictions.
10. Ask the students to observe a small sample of each sand under a microscope.
11. Write down all predictions and draw a diagram of what each sand looks like under the microscope.

Assessment:

Assessment will be both formal and informal. Students must be able to express something that they know or have learned about the Great Salt Lake sometime during this lesson. Observe this by traveling by each group and asking the students various questions about their experiments and/or predictions. Students must complete the steps of the observation/experiment, which include recording predictions and observations in order to get credit for this assignment.

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Does sand dissolve in vinegar?

Abstract: Students will predict what will happen to sand when it is mixed with an acidic liquid. They will observe what occurs when both oolitic sand and Black Rock sand are mixed with water and vinegar.

Grade Level: 2nd

Utah State Core Curriculum:

Standard 6: Students will investigate changes in rocks.

Objective 1:

Examine and discuss observable characteristics of rock.

Collect a variety of rocks from different locations and record where they were found.

Make a list of the different characteristics of collected rocks (e.g., hard vs. soft, shiny vs. dull, smooth vs. rough, single color vs. multi-colored).

Make an illustration of a rock that shows two characteristics.

Objective 3:

Observe and list how rocks change due to elements in the environment.

Demonstrate how rocks are naturally broken down into smaller rocks.

Explain how small rocks become bigger rocks naturally.

Illustrate a simple rock cycle.

Instructional Time: 30-60 minutes

Terminology:

Oolitic Sand: Round sand formed at the Great Salt Lake by calcification.

Calcification: Process by which calcium hardens on a surface.

Acid: Substance with a pH below 7.

Base: Substance with a pH above 7.

Dissolve: melt, disappear, or break up.

Intended Learning Outcomes:

-Students will predict what will happen when sand is mixed with vinegar.

-Students will observe what happens when an acid (vinegar) and a base (oolitic sand) are mixed.

Background Knowledge: Oolitic sand is formed at the Great Salt Lake (and other places.) It is formed by the calcification of small particles. These small particles can be dirt, brine shrimp casings or other particles. Layers of calcium form around the particle, creating a tiny sphere. Made of calcium, these oolitic sand crystals are basic. When mixed with an acid, they dissolve.

Materials:

Oolitic sand (at least a few cups)
Black Rock sand (at least a few cups)
Small dishes (such as Petri dishes)
Household white vinegar

Assessment of Prior Knowledge: Students will create a KWL chart illustrating what they already know about sand, specifically oolitic sand. This chart can be referred to throughout this lesson. Discuss results from previous lessons in this unit, and what discoveries have been made. Use this information to guide students in their experiments and to prompt further questioning throughout the lesson.

Instructional Procedures:

- The class will be divided into groups, each group will receive 3 Tbsp of each type of sand, 6 small dishes, and 9 Tbsp each distilled water and vinegar.
- Before the experiment, each group member will record his or her prediction about what will happen to the sand. Have them use their prior knowledge to form their predictions. What happened to sand mixed with water last time? What do they know about oolitic sand? What do they know about vinegar?
- Each group will set up their experiment. They will measure 1 Tbsp of oolitic sand into each of 3 of the small dishes, 1 Tbsp of Black Rock sand into each of the other 3 dishes. They will then measure 3Tbsp of vinegar into the dishes.
- The experiments will be observed for ten minutes. The students will record their observations immediately, at five minutes, and at ten minutes.
- Introduce the terms “acid” and “base” during the discussion following the experiment. If the students don’t ask why the sand began to dissolve, you can spark the discussion by asking them.
- Students will compare their findings to their predictions.

Discussion Questions:

1. What happened?
2. Why do you think that happened?
3. Why did the salt dissolve in vinegar and not in water?
4. Based on what you know about acidic liquids, what do you think would happen if you mixed the sand with various liquids?
5. Did you observe differences between the two types of sand? Why?

Assessment Strategies:

- Assessment will be informal and will be based on the following questions.
- Did the students predict what would happen?

- Did the students record their predictions and observations as required of them?
- Did the students participate in the discussions and in their groups?
- Did the students generate a new question?
- Did the students gain a basic understanding of acids and bases?