Cave of the Winds Activity Three: Create a Cave For Grades K-5

Lesson for Grades K-5

About 30-45 minutes

Satisfies Colorado Model Content Standards for Science:

Grades K-2: Standard 5, Benchmark 1. Basic observable patterns and changes in the world can help to predict future events based on those patterns.

Grades 3-5: Standard 4, Benchmark 2. Natural processes change Earth's surface (for example: weathering, erosion, mountain building, volcanic activity, earthquakes and floods).

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Create a Cave!

Objective

The students will conceptualize how water carves or creates caves.

Materials

- Modeling clay (4 oz. per student or group)
- Sugar cubes (3-6 per cave)
- Warm water
- See-through bowls (1 per student or group)
- Transparency of "Making the Cave" diagram
- Overhead projector
- Copies of Create a Cave Student Worksheet

Background

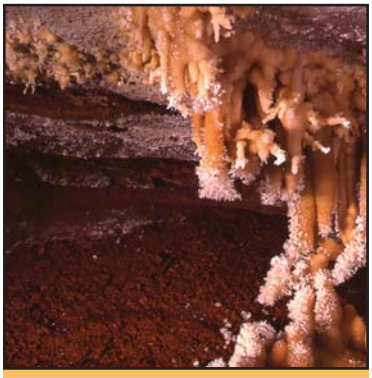
Scientists believe that a shallow sea once covered much of Colorado more than 360 million years ago. Sediments from dead marine life were deposited one layer at a time on the sea floor. Over the course of millions of years, gravity compacted the lower layers into a firm rock called "limestone".

After millions more years passed, the continent of North America began to rise slowly out of the sea. As the ancient seas receded, the earth's mountain building forces lifted the area above the sea. As these layers of rock were exposed to the air, and the earth's surface continued to change, the process of forming the limestone caves could begin. These same mountain building forces bent, twisted, and fractured the limestone, causing joints or cracks in the rock.

Because the uplifted limestone beds laid down by the sea creatures were softer than many rock formations, cracks in the limestone located below the water table soon began to erode. In time, the small cracks grew to be large cracks and eventually large chambers. As the water table dropped over the course of millions of years, the chambers and passageways filled with air. And that is how the large rooms and winding passageways of Cave of the Winds were formed: water gently carved them out of the solid limestone deposits left behind by sea creatures eons before.

Procedure

1. Ask the students what is takes to make a cave. Write the students' answers on the blackboard (rocks, water, time, etc.).
2. Pass out a lump of clay to each student (or each group of students). The clay represents the limestone in our model.
3. Pass out 3-6 sugar cubes, to make different sized caves. The sugar cubes will be the softer, more fractured limestone in our model.
4. Have the students flatten their clay out into a "pancake." Then they should place the sugar cubes on the clay, so that each cube touches the other, and with at least one cube touching the edge of the clay.
5. The students wrap the clay around the sugar cubes, forming a ball. The students need to make sure that at least one sugar cube is exposed. (See "Making the Caves" instruction sheet.)



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6. Ask, "Now that we have our rock layers, what do we need to turn it into a cave?" The students should respond, "Water." Each student or group should have a small see-through bowl, (cutting the top off 2-liter bottles works well).
7. Instruct the students to put their cave in the water. The students should observe what happens.
8. The students might observe:
   a. That nothing is happening.
   b. The cave might bubble for a minute or so until the sugar starts to dissolve. (This reinforces the idea that it takes some time for a cave to form.)
   c. The sugar will begin to dissolve leaving a hole behind. The students can remove their cave from the water and look at it.
9. The class groups back together and notes their observations on the board. The teacher asks the students to fill out their Create a Cave Student Worksheet.

Conclusion

We have made models of a limestone cave. For natural places like caves to form, we know it takes a long time and the right ingredients. That is why we need to take care of our special natural places.

Cave of the Winds

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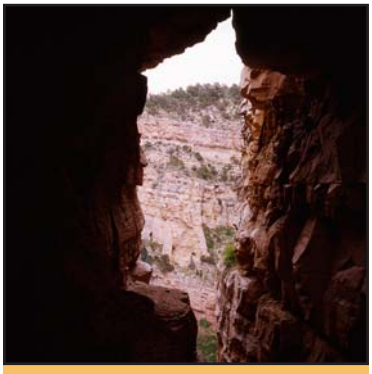
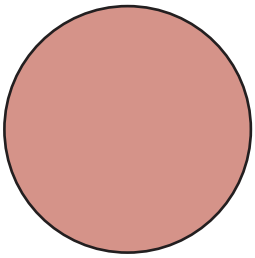
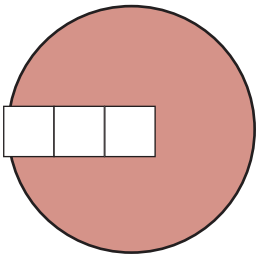


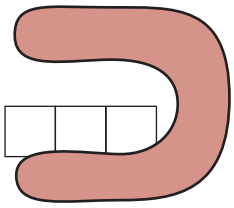
Create a Cave!



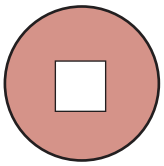
1. Flatten the clay into a round, pancake shape.



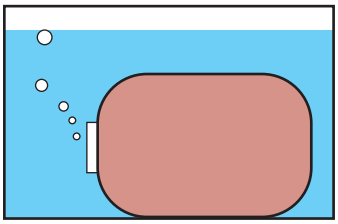
2. Place the sugar cubes on top of the clay, all touching each other. Make sure one of the cubes extends beyond the edge of the clay.



3. Wrap the clay around the sugar cubes…



4. …forming a ball. Make sure at least one sugar cube is exposed.



5. When the ball of clay is placed in water, the sugar cube will dissolve, leaving a “limestone cave” behind.

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Fill in the blanks by using these words:

LIMESTONE
DISSOLVE
TIME
FRACTURED LIMESTONE
WATER

1. The clay in our model is _____ rock.
2. The sugar cubes in our model are _____ rock.
3. It takes _____ and _____ to make a cave.
4. Fractured limestone is the softer rock that can _____.

Observations

1. What do you see happening right away?

2. What happens next?

3. What do you have left in the end?

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