CREATE A CAVE

Adapted from*: Making Connections,* a Teacher Guide to Mammoth Cave National Park.

GRADE LEVEL: Elementary / Intermediate

SUBJECTS: Earth Science

RELATED COLORADO CONTENT STANDARDS: SC(1-6).1, SC(1-6).4 SC(1-6).6

TIME: 30-45 Minutes

OBJECTIVE: The students will conceptualize how water carves or creates caves.

MATERIALS:

- Modeling clay (4 oz. per
- student or group)
- Sugar cubes (3-6 / cave)
- Warm water
- See-through bowls (1 per student or group)
- Transparency of "How Caves are Formed" diagram
- Overhead projector
- Copies of student worksheet

BACKGROUND:

Scientists believe that a shallow sea once covered the Glenwood Springs area and 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".

Glenwood Caverns is located in the **Leadville Limestone** deposit created during the **Mississippian** period of our earth's formation, some 325 million years ago.
Millions more years passed, and 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 Glenwood Caverns were formed: water gently carved them out of the solid limestone deposits left behind by sea creatures eons before.

CREATE A CAVE (continued)

PROCEDURE:

1. Ask the students what is takes to make a cave. Write the student's 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.)

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.

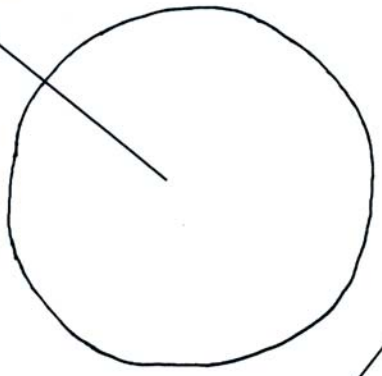
8. The students may observe: 1) That nothing is happening. 2) The cave may bubble for a minute or so until the sugar starts to dissolve. (This reinforces the idea that it takes some time for a cave to form.) 3) The sugar will begin to dissolve leaving a hole behind. The students can remove their cave 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.

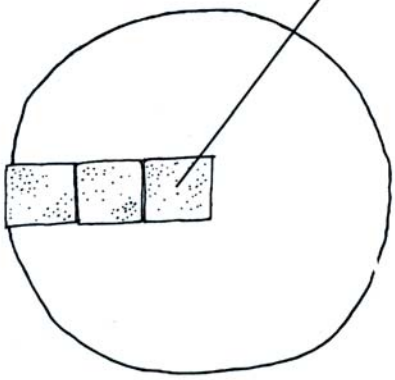
CONCLUSION: We have made models of a limestone cave. For natural places like caves to form we know it takes a long time and the right ingredients. That is why we need to take care of our special natural places.

Making the Caves

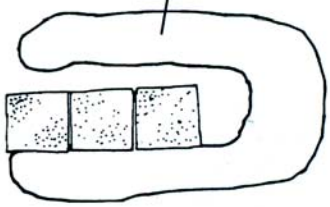
1. Flatten the clay into a pancake shape.



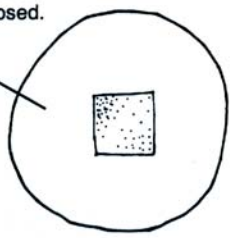
2. Place the sugar cubes on the clay, all touching each other. Make certain that at least one cube is at the edge of the clay.



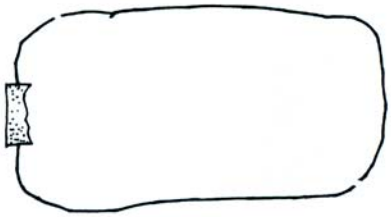
3. Wrap the clay around the sugar cubes…



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



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



CREATE A CAVE
Student Worksheet

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?