

“Ch-Ch-Ch-Changes” in Land Formations!

Did you know that caves are like sugar? Really, they are! Caves are made up of limestone that is soluble. If something is soluble, it means that the substance dissolves in water. We have learned that sugar dissolves in things like sweet tea and drink mixes. Unlike tea, however, the formation that caves undergo is a much longer process.

Project Tasks

After researching water’s role in cave formation, we will experience this process as a class, using clay, a clear cup of water, and sugar cubes. To prepare:

1. Use the “Shaping Landforms Checklist” (page 297) to help you understand this project.
2. Read a book or watch a video about how caves are formed. (See suggestions in Resources Needed.)
3. Collect the following tools for your group experiment.
 - ♦ One ball of clay
 - ♦ One clear cup of water (filled halfway)
 - ♦ Four sugar cubes
 - ♦ The “Predict, Observe, Explain Chart” (page 297)
 - ♦ A pencil
 - ♦ A computer or tablet computer

To conduct the experiment:

1. Flatten out the clay, and press the sugar cubes, in groups of two, into the clay, keeping the cubes close together. This should result in a 2×2 square of sugar cubes.
2. Wrap the clay around the sugar cubes, leaving one side of the cubes visible but firmly in the clay, creating the shape of a ball.
3. What do you think will happen if you place the ball into the water? Complete the predict portion of your “Predict, Observe, Explain Chart.”
4. Place the ball into the water, making sure that the sugar cubes are visible from outside the clear cup, so that all group members may see the changes occurring.
5. During the experiment, complete the observe portion of your “Predict, Observe, Explain Chart.”
6. Complete the explain portion of the experiment addressing each of the following questions.
 - ♦ What did the clay and sugar cubes represent in the experiment?
 - ♦ Why do you think the sugar cubes dissolved in the water?
 - ♦ What was the purpose of this experiment?

Now you will create your own and present your findings.

1. Each group should choose a different land change to learn about. Your group should develop three questions for your land change research and have your teacher approve them. Use the “Land Change Research Question Organizer” (page 298) and the “Research Question Organizer” (page 299) for this. Use your technology resources to answer your questions.
2. Design a model to showcase that land change. Complete the “Land Change Model Sketch” on page 299. You can select your own materials and decide how you want to demonstrate your land change. Review the checklist to help your group understand this task.
3. Collect the tools your group will use to create a model. Before you begin, obtain another “Predict, Observe, Explain Chart,” and complete the predict section of the chart.
4. While creating your model, complete the observe portion of your “Predict, Observe, Explain Chart.” Take pictures throughout the process to document your work.
5. As you finish your model, complete the explain portion of the experiment answering each of the following questions.
 - ◆ What effect does water and wind have on the land changes your group chose?
 - ◆ How do you believe the land would be different if water and wind were not present?
 - ◆ In what areas is your land change most common? Why do you think that is?
6. Choose a form of technology to help you share your observations and explanations with your assigned first-grade class group. Each group member must explain, within the presentation, his or her role in the product’s creation. Share your observations and explanations with the first-grade class. You may create an Animoto (<https://animoto.com>), Piktochart (<https://piktochart.com>), or Smore (www.smore.com) for your presentation. Your presentation must have the following.
 - ◆ Pictures of the creation of the model
 - ◆ Research from at least two credible sources (one website, one book)
 - ◆ Your role in the group task
7. Each group member must also develop one question to ask the audience during the presentation. After the presentation, the first-grade students will provide feedback for your work.

Shaping Landforms Checklist

Every student is expected to complete each of the following steps on the checklist. Place a check mark next to the item as you finish each task.

CHECK WHEN COMPLETE	TASK
	I completed <i>each</i> written section of my “Predict, Observe, Explain Chart.”
	I drew pictures to go along with my written predictions and observations on my worksheet.
	I helped my group choose three research questions. We used the “Land Change Research Question Organizer” and received teacher approval before we began research.
	I actively participated in my group’s research, and we used: <ul style="list-style-type: none"> • The research organizer • One credible website • One credible book source
	I assisted my group in taking photographs of our model as it was being created.
	I helped the other members in my group use technology to create a presentation.
	My group explained the landform, using the pictures of our model, in our technology presentation.
	My group used the “Land Change Model Sketch” planner.
	My group demonstrated a real-life example of something that is soluble.
	I explained my role in the task during my group’s presentation.

Predict, Observe, Explain Chart

My group chose to create a model of _____.

Directions: In the following boxes, you will write your predictions of what might happen when you use particular resources to create your model, what you observe while creating the model, and what you learned throughout your research and investigation.

PREDICT	OBSERVE	EXPLAIN

Directions: Under Predict and Observe, draw pictures that match what you wrote about.

PREDICT	OBSERVE

Land Change Research Question Organizer

Use this chart to plan your research questions for land change. Be sure to partner with your teacher for feedback on your planned questions.

Land change choice: _____

RESEARCH QUESTION	TEACHER APPROVAL
1.	
2.	
3.	

Land Change Model Sketch

Before you begin creating your model, make a plan.

What do you think your model should look like when you begin? What about in the middle of your demonstration? What should it look like when you are finished?

Beginning	
Middle	
End	

Research Question Organizer

Use this chart to help you organize your research.

RESEARCH QUESTION	NOTES	SOURCE
1.		
2.		
3.		

Scoring Rubric

	1 SIGNIFICANT REVISION NEEDED	2 SOME REVISION NEEDED	3 PROFICIENT	4 EXCEEDS EXPECTATIONS
Objective 1: Students will complete and reflect on an experiment demonstrating water's role in the formation of caves.	<p>Student does not successfully complete the experiment.</p> <p>Student fails to complete the "Predict, Observe, Explain Chart's" written section.</p> <p>Student's graphic section of the "Predict, Observe, Explain Chart" lacks pictures.</p>	<p>Student successfully completes the experiment with significant assistance from the teacher.</p> <p>Student completes the "Predict, Observe, Explain Chart's" written section.</p> <p>Pictures are not included within student's "Predict, Observe, Explain Chart."</p>	<p>Student adequately completes the experiment.</p> <p>Student completes the "Predict, Observe, Explain Chart's" written section, logically.</p> <p>Pictures are included within student's "Predict, Observe, Explain Chart."</p>	<p>Student completes the experiment and shows leadership skills.</p> <p>Student's chart shows well-thought-out predictions, detailed observations, and educated assumptions for explanations.</p> <p>Student includes detailed pictures within the "Predict, Observe, Explain Chart."</p>
Objective 2: Students will research land movements and create a model showing the effects water and wind have on land.	<p>Student does not develop three research questions and does not gain approval from the teacher.</p> <p>Student does not participate in research.</p> <p>Student does not participate in the creation of the final product.</p>	<p>Student develops two research questions and gains approval from the teacher.</p> <p>Student offers some participation in land movement research.</p> <p>Student offers some participation in the creation of the final product.</p>	<p>Student develops three thoughtful research questions and gains approval from the teacher.</p> <p>Student participates in land movement research.</p> <p>Student participates in the creation of the final product.</p>	<p>Student develops three challenging research questions and gains approval from the teacher.</p> <p>Student participates in land movement research and shows leadership in his or her group.</p> <p>Student participates in the creation of the final product and shows leadership in his or her group.</p>

	1 SIGNIFICANT REVISION NEEDED	2 SOME REVISION NEEDED	3 PROFICIENT	4 EXCEEDS EXPECTATIONS
<p>Objective 3: Students will present and explain a model showing the effects of water and wind on land and develop relevant questions to ask their audience.</p>	<p>Student does not explain his or her role in the group during the presentation.</p> <p>Technology presentation or flyer fails to provide the audience with information regarding how water and wind change the land.</p> <p>Student does not develop or ask the audience a question.</p> <p>The group does not include a real-life example of a soluble substance.</p>	<p>Student vaguely explains his or her role in the group during the presentation.</p> <p>Presentation or flyer is very vague in providing information on how the land is affected. Pictures are not present in the final product.</p> <p>Student may develop a question but does not ask the audience. The question may be unclear.</p> <p>The group includes a real-life example of a soluble substance but may not explain what the term means.</p>	<p>Student adequately explains his or her role in the group during the presentation.</p> <p>Student's group uses technology to explain how its model is a good representation of land changes due to water and wind. Students do use one credible website or one book to conduct their research.</p> <p>Student develops a clear and appropriate question and asks the audience.</p> <p>The group includes a real-life example of a soluble substance and explains the term.</p>	<p>Student explains his or her role in the group in detail during the presentation.</p> <p>Student's group presentation or flyer is authentic and clearly provides the audience with an understanding of the natural effects on the land chosen. Each student's role in creating the presentation is addressed, and two credible sources are used to complete research (one website, one book).</p> <p>Student develops a clear and challenging question and asks the audience.</p> <p>The group includes a real-life example of a soluble substance and thoroughly explains the term.</p>