*1 class period** u

BACK TO THE BIG QUESTION INTRODUCTION

Learning Set 1

Back to the Big Question

Overview

Students try to explain the changes that have occurred at their Earth structure based on the information they have from the topographic map, the pen-pal letter, the three-dimensional map, the data maps they created using *My World,* and evidence comparing their Earth structure to others in its group. Students then share their explanations and update their *Project Board.*

*A class period is considered to be one 40 to 50 minute class.

Targeted Concepts, Skills, and Nature of Science	Performance Expectations
Scientists often work together and then share their findings. Sharing findings makes new information available and helps scientists refine their ideas and build on others' ideas. When another person or group's idea is used, credit needs to be given.	Students share their explanations and discuss what they have learned.
Scientists must keep clear, accurate, and descriptive records of what they do so they can share their work with others and consider what they did, why they did it, and what they want to do next.	Students should refer to their former work to construct their explanations.
Identifying factors that lead to variation is an important part of scientific investigation.	Students should identify what they think causes change in their Earth structure.
Scientists make claims (conclusions) based on evidence obtained (trends in data) from reliable investigations.	Students should begin to formulate claims about their Earth structure and patterns of earthquake and volcanic activity.
Explanations are claims supported by evidence, accepted ideas, and facts.	Students should construct an explanation.

Targeted Concepts, Skills, and Nature of Science	Performance Expectations
Scientists use models to simulate processes that happen too fast, too slow, on a scale that cannot be observed directly (either too small or too large), or that are too dangerous.	Students should refer to the models (topo maps, three-dimensional maps, and computer generated maps) used in their Explanations.
Scientists use models and tools such as *Geographic Information Systems,* and a variety of maps to develop claims and explanations from evidence in the data.	Students should use the information from their models (topo maps, three-dimensional maps, and computer generated maps) in their explanations.
Earthquake activity, volcanic activity, and topography are all evidence that Earth's crust is moving and changing.	Students should begin to form claims that there is a connection between topography and earthquake and volcanic activity.
Interactions between Earth's crustal plates can result in mountain-building, rift valleys, and geologic activity such as Earthquakes and volcanoes. Underwater volcanic activity may form underwater mountains, which can thrust above the ocean's surface to become islands.	Students should form claims that underwater volcanic activity can form islands.

Materials

1 per student	group's pen-pal letter
1 per class	class *Project Board*
1 per student	*Create Your Explanation* page
1 per student	*Project Board* page

Homework Options

Preparation for Learning Set 2

- **Science Content:** *What do you think is inside of the Earth? (Students should describe what they think Earth is made of.)*

BACK TO THE BIG QUESTION IMPLEMENTATION

*1 class period** u

Learning Set 1

Back to the Big Question

5 min.

Review what students have done so far, and introduce the explanation.

Learning Set 1

Back to the Big Question

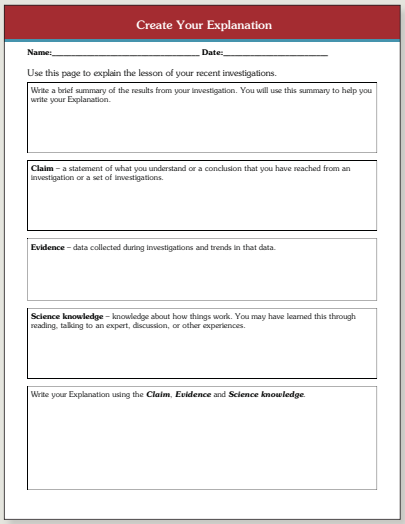
How can you explain the changes happening around the regions of certain Earth structures?

The *Big Question* for this Unit is *How can you explain the changes happening around the regions of certain Earth structures?* To help you answer this question, you looked at representations of your Earth structure and compared them to other Earth structures. By using different types of maps, you were able to determine the size and shape, or topography, of your earth structure.

In the last section of this *Learning Set*, all of the Earth structures were grouped according to shape. Your team wrote a description of the overall characteristics of one of these groups of earth structures. Now you will make a first attempt at explaining the changes that have occurred at your Earth structure, as well as others in the same group.

Create Your Explanation

Using the topographic map and facts sent to you by your pen pal, along with the three-dimensional map and data map you created, try to explain the changes that have occurred at your Earth structure. When you have completed that, compare your Earth structure to other Earth structures in the same group. Add any additional evidence from this comparison to your explanation.



Create Your Explanation

Name:_____ Date:_____

Use this page to explain the lesson of your recent investigations.

Write a brief summary of the results from your investigation. You will use this summary to help you write your Explanation.

Claim – a statement of what you understand or a conclusion that you have reached from an investigation or a set of investigations.

Evidence – data collected during investigations and trends in that data.

Science knowledge – knowledge about how things work. You may have learned this through reading, talking to an expert, discussion, or other experiences.

Write your Explanation using the ***Claim***, ***Evidence*** and ***Science knowledge***.

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EARTH STRUCTURES AND PROCESSES

△ Guide

Review with students what they have done in this *Learning Set*. Then let students know that they will be using all the information they have gathered to explain how the changes at their Earth structure and their Earth structure's group occur.

Remind students that an explanation is a claim that is backed up in a logical way by evidence and science knowledge.

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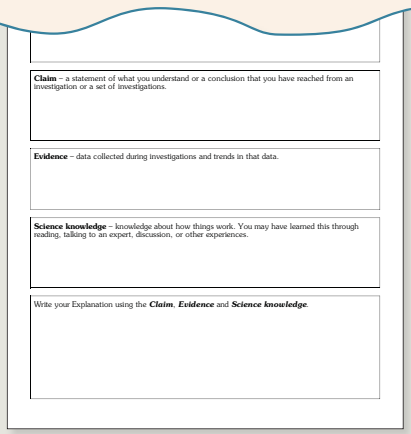
of one [illegible] groups of earth structures. Now you will make a first attempt at explaining the changes that have occurred at your Earth structure, as well as others in the same group.

Create Your Explanation

Using the topographic map and facts sent to you by your pen pal, along with the three-dimensional map and data map you created, try to explain the changes that have occurred at your Earth structure. When you have completed that, compare your Earth structure to other Earth structures in the same group. Add any additional evidence from this comparison to your explanation.



Create Your Explanation

10 min.

Have groups construct their explanation.

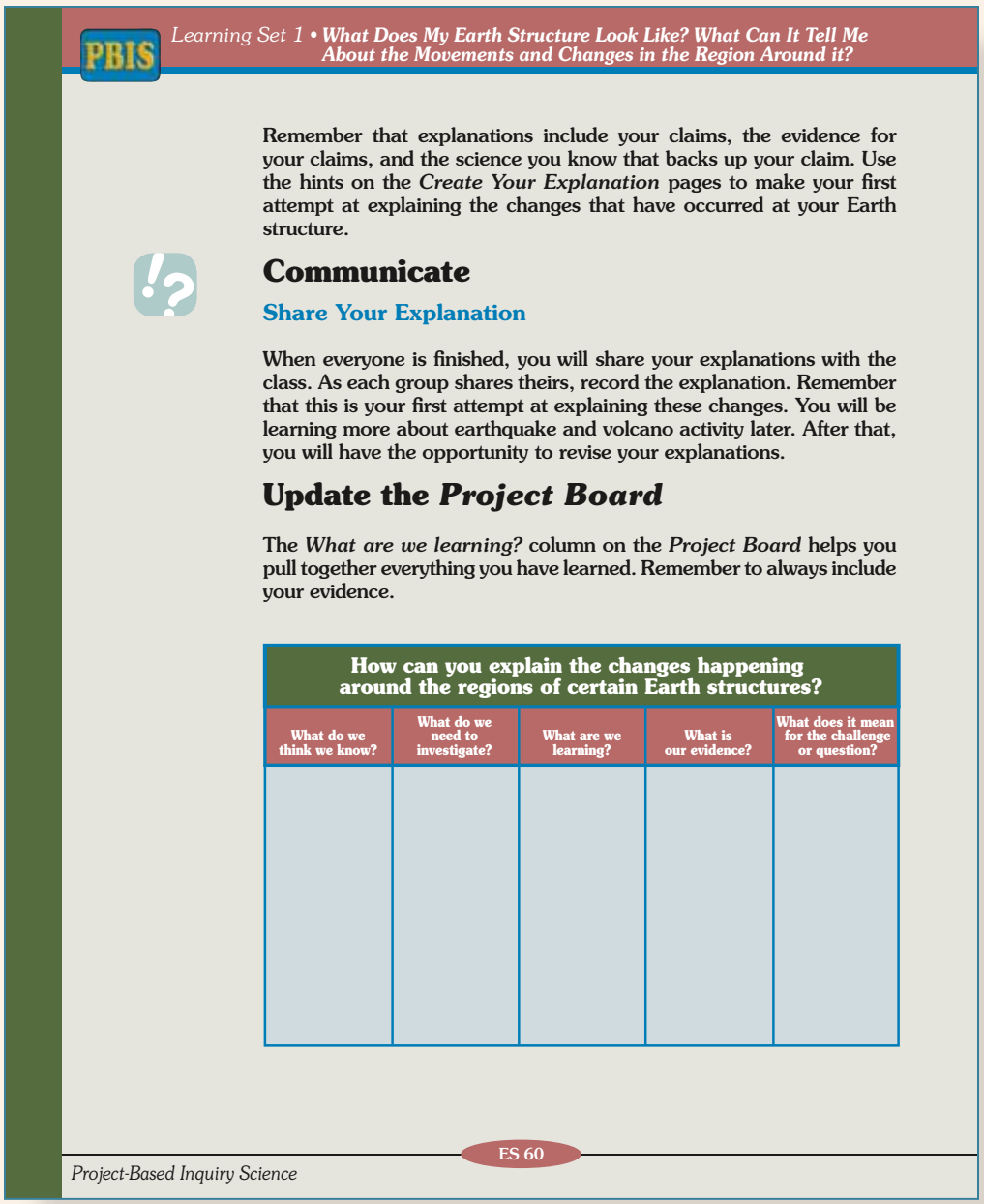
△ Guide

Describe for students that they should construct their explanation based on all the data they have from their pen-pal letter, topographic map, three-dimensional map, and the information they wrote from their Earth structure's group.

Communicate: Share Your Explanation

20 min.

Have students share their explanations with the class.



Remember that explanations include your claims, the evidence for your claims, and the science you know that backs up your claim. Use the hints on the *Create Your Explanation* pages to make your first attempt at explaining the changes that have occurred at your Earth structure.

Communicate

Share Your Explanation

When everyone is finished, you will share your explanations with the class. As each group shares theirs, record the explanation. Remember that this is your first attempt at explaining these changes. You will be learning more about earthquake and volcano activity later. After that, you will have the opportunity to revise your explanations.

Update the *Project Board*

The *What are we learning?* column on the *Project Board* helps you pull together everything you have learned. Remember to always include your evidence.

How can you explain the changes happening around the regions of certain Earth structures?				
What do we think we know?	What do we need to investigate?	What are we learning?	What is our evidence?	What does it mean for the challenge or question?

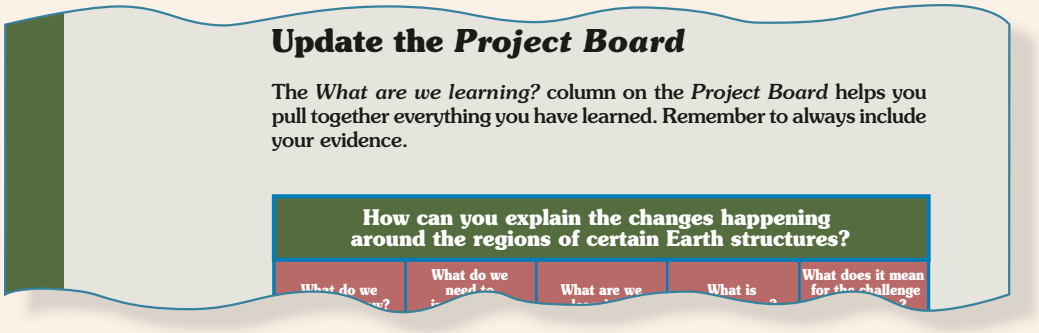
META NOTES

The class discussion should be more informal as students do not have substantial evidence to back up claims. However, students need to hear each other's explanations to help generate questions.

△ Guide

Begin by letting groups know that they will be presenting and discussing their explanation. Emphasize that they will not spend time revising their explanation today, but they will later.

Then have the first group present. Remind students that the audience should be checking the structure of the explanation, and its content. Then begin the presentations.



Update the *Project Board*

10 min.

Guide a class discussion to update the Project Board.

△ Guide

Begin by asking the class to consider all they have discussed so far and then come up with some of the similarities and differences they observed of the topography and add this information to the *Project Board.*

Then ask the class what should be put in the *What we have learned?* column and in the *What is our evidence?* column *Project Board.* Items placed in these columns should be general enough to include information of groups of similar Earth structures. The evidence however may be more detailed, for example giving specific values of elevation or depth that students noted from the *My World* data maps.

Example:

Column 3 (Claim): Most of the island structures were in a curved ring or chain.

Column4 (Evidence): The topographic maps, three-dimensional models, and *My World* elevation maps all showed that the island structures we considered were a chain of islands that were traced out a curved shape.

Column 3 (Claim): There were gentle slopes on one side of most of the islands and steep slopes on the other side of the islands that continued underwater

Column4 (Evidence): The topographic maps, three-dimensional models, and *My World* elevation maps show that the greatest change of elevation for most of the island chains were only on one side of the island, while the other side of the island had a gentle slope.

Also, ask students if they want to add anything to the first or second column.

Teacher Reflection Questions

- What relationships are the students making between the shape of the land and earthquakes and volcanoes? Did this change at all from the last section?
- What difficulties did students have constructing explanations? What seemed to be easy for the students involving the explanations?
- How did you promote student participation in updating the *Project Board?*

META NOTES

Since students finished the last section updating their *Project Board,* they may not have much to add. Focus this discussion and adding students' claims to column 3 and their supporting evidence to column 4.