

Lesson 2.1: Considering What's Underneath Earth's Plates

You know that *Mesosaurus* fossils are now separated by a plate boundary and that there is evidence of plate motion. How did the plates move? Was the movement sudden or gradual? Today, you're going to learn about what is under the plates and how this affects plate movement. You will gather evidence from a hands-on investigation, the *Plate Motion* Sim, and conversation with your classmates, so that you can begin to answer these questions.

Unit Question

- Why are fossils of species that once lived together found in different locations on Earth now?

Chapter 2 Question

- How did the South American Plate and African Plate move?

Vocabulary

- earthquake
- mantle
- outer layer
- pattern
- plate
- plate boundary

Digital Tools

- *Plate Motion* Simulation

Name: _____

Date: _____

Warm-Up

To: Student Geologists

From: Dr. Bayard Moraga, Lead Curator, Museum of West Namibia

Subject: How Did the South American Plate and African Plate Move?



Thank you for your work to determine that today *Mesosaurus* fossils are found on two different plates and these plates have a plate boundary between them. These are important pieces of the story we need to tell in our museum exhibit! Now we are curious about how the *Mesosaurus* fossils got separated by such a great distance.

We would like you to investigate this question: *How did the South American Plate and African Plate move?*

Given what you know right now, how would you respond to the question from Dr. Moraga: *How did the South American Plate and African Plate move?*

Considering the Mantle

We know that Earth's outer layer is made of hard, solid rock divided into plates, and we know those plates move. But how? Below the outer layer is the mantle. In this activity, you will use the Sim to investigate how the composition of the mantle might allow the plates to move.

1. Open the Sim.
2. Select Region 1 from the Globe View.
3. Adjust the mantle setting to Hard Solid. Press RUN and observe the motion of the plates. Record your observations in the data table below.
4. Once the run has ended, press BUILD. Adjust the mantle setting to Soft Solid. Press RUN and observe the motion of the plates. Record your observations in the data table below.
5. After you complete the table, answer the discussion questions with your partner. Be ready to share your ideas about the mantle with the class.

Mantle setting	Observations of plate motion
Hard solid	
Soft solid	

Discuss the following questions with a partner, and then record your response:

Based on your results, what do you think the rock in Earth's mantle is like? Is the mantle made of hard, solid rock or soft, solid rock? Explain your ideas.

Name: _____

Date: _____

Exploring Characteristics of the Mantle

How is a soft, solid material different from a hard, solid material?

Use the Silly Putty and plastic cube to investigate how soft, solid materials are different from hard, solid materials. Record your observations of the materials in the data table below.

Hint: Try to answer the following questions: What can the soft, solid material do that the hard, solid material can't? What happens when you press into each of the solids?

Mantle setting	Observations
Soft, solid material: Silly Putty	
Hard, solid material: plastic cube	

Discuss the following question with your partner, using evidence from your investigation of the two materials: *How is a soft, solid material different from a hard, solid material?*

Name: _____

Date: _____

Word Relationships

Some visitors at the Museum of West Namibia have never learned anything about Earth's plates, plate boundaries, or mantle. Use the Word Relationships Cards to create sentences that help explain to these visitors how these parts of Earth work together.

Create sentences that answer both of these questions:

1. How can Silly Putty and a hard, plastic cube be used to model different layers of Earth?
2. How are Earth's plates able to move?
 - Use at least two different Word Relationships Cards in each sentence. In your group of four, take turns as both the speaker and the listener.
 - Your group may use the same word more than once. You do not need to use all the vocabulary words.
 - There are many different ways to answer these questions, and you will need to create more than one sentence in order to express your ideas completely.

Word Bank

mantle	outer layer	plate	plate boundary
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Name: _____

Date: _____

Homework: Plate Motion on Other Planets

Scientists believe that some other planets in the universe might have a geologic structure similar to Earth's, including a mantle and an outer layer made of plates.

Imagine that scientists have found a planet with an outer layer divided into plates made of hard, solid rock, but the mantle below the plates is made of **hard**, solid rock instead of **soft**, solid rock as it is on Earth.

Word Bank

mantle	outer layer	plate	plate boundary
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Do you think plate motion would take place on that planet? Why or why not? (Use the words in the Word Bank if it helps you answer the question.)
