

Name: _____

Date: _____

Lesson 2.2: "Listening to Earth"

Your research has shown that a plate boundary exists between the South American Plate and African Plate, both of which are on top of the mantle. But how do the plates and mantle interact? What happens at plate boundaries? Dr. Moraga has sent you an article about a scientist who investigates plate boundaries. After reading, you'll be able to use what you have learned to explain which type of plate boundary lies between the two plates where *Mesosaurus* fossils are found. You'll also be able to explain what this plate boundary tells us about the history of these two plates and the fossils that are found on them.

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?

Key Concepts

- Earth's plates move on top of a soft, solid layer of rock called the mantle.

Vocabulary

- convergent
- cross section
- divergent
- earthquake
- mantle
- outer layer
- pattern
- plate
- plate boundary

Active Reading Guidelines

1. Think carefully about what you read. Pay attention to your own understanding.
2. As you read, annotate the text to make a record of your thinking. Highlight challenging words and add notes to record questions and make connections to your own experience.
3. Examine all visual representations carefully. Consider how they go together with the text.
4. After you read, discuss what you have read with others to help you better understand the text.

19

Discussing Annotations

#share
Carefully choose an interesting annotation (comment, question, connection, vocabulary word) you'd like to share with your partner and add #share to this annotation.

#discussed
Add #discussed to your annotation if you feel that you and your partner have resolved a question OR if your discussion gave you a deeper understanding about something in the article.

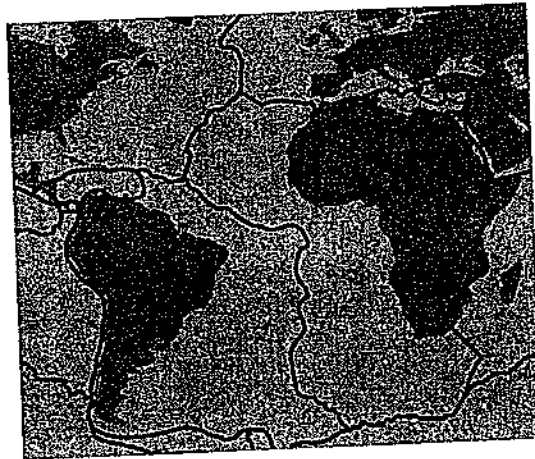
#present
Add #present to your annotation to mark any unresolved questions or ideas you would like to present to the class.

20

Name: _____

Date: _____

Warm-Up



Imagine that you could dive deep into the Atlantic Ocean where the South American Plate and African Plate meet at a plate boundary.

Make a prediction: What do you think you would see at the plate boundary? Would you see the mantle? Why or why not?

Name: _____ Date: _____

use #Share #discussed
Reading "Listening to Earth"

1. Read and annotate the article "Listening to Earth."
2. Choose and mark annotations to discuss with your partner. Once you have discussed these annotations, mark them as discussed.
3. Now, choose and mark a question or connection, either one you already discussed or a different one you still want to discuss with the class.
4. Answer the reflection question below.

Rate how successful you were at using Active Reading skills by responding to the following statement:

As I read, I paid attention to my own understanding and recorded my thoughts and questions.

- Never
- Almost never
- Sometimes
- Frequently/often
- All the time

Active Reading Guidelines

1. Think carefully about what you read. Pay attention to your own understanding.
2. As you read, annotate the text to make a record of your thinking. Highlight challenging words and add notes to record questions and make connections to your own experience.
3. Examine all visual representations carefully. Consider how they go together with the text.
4. After you read, discuss what you have read with others to help you better understand the text.

Name: _____

Date: _____

Homework: Making Connections to Science Ideas

Think of another science topic that you have studied in the past. What patterns did we look for when we were studying that topic? What patterns are we looking for now? How are the patterns similar or different? See if you can make connections between patterns in the *Plate Motion* unit and patterns in one of the topics below.

- geology
- evolution
- ecosystems
- light and energy
- solar system
- Earth (or Earth's atmosphere and oceans)
- a science topic that is not listed above

List the science topic you have selected here: _____

In the space below, describe the patterns we looked for when studying that science topic and explain how they are similar to or different from the patterns we are looking for now.

Name: _____

Date: _____

Lesson 2.3: Explaining Plate-Mantle Interactions

In the article "Listening to Earth," you read about sounds that can be heard deep in the ocean when the enormous plates of Earth's outer layer move. Earth's plates are constantly moving, and it is hard to imagine exactly what is happening to the plates and the mantle at plate boundaries. To gain a better understanding of this, you will use towels to model what happens when Earth's plates move toward or away from each other at convergent and divergent plate boundaries.

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?

Key Concepts

- Earth's plates move on top of a soft, solid layer of rock called the mantle.

Vocabulary

- convergent
- cross section
- divergent
- earthquake
- evidence
- mantle
- mid-ocean ridge
- plate
- plate boundary
- trench

Lesson 2.3

There are no projections for this lesson.

Name: _____ Date: _____

Warm-Up



To: Student Geologists
From: Dr. Bayard Moraga, Lead Curator, Museum of West Namibia
Subject: Divergent or Convergent Plate Boundary?

I hope that referring to the article "Listening to Earth" will help you to decide whether the boundary between the South American Plate and the African Plate is a divergent or convergent plate boundary. If you can help us decide which type of boundary is between the plates where *Mesosaurus* fossils are found now, perhaps we will have more clues about how these fossils got so far away from each other. Keep up the good work!

Given what you know right now, do you think the boundary between the South American Plate and the African Plate is a divergent plate boundary or a convergent plate boundary? Why? Explain your answer.

Name: _____

Date: _____

Rereading "Listening to Earth"

Take out the "Listening to Earth" article that you read in the previous lesson. Read the second paragraph of the "Listening to Convergent Boundaries" section and the first paragraph of the "Listening to Divergent Boundaries" section. Highlight any information in the text that helps answer the three questions below. Make annotations as needed.

1. How do plates move at each type of plate boundary?
2. How do the plates and mantle interact at each type of plate boundary?
3. What landforms are commonly found at or near each type of plate boundary?

Active Reading Guidelines

1. Think carefully about what you read. Pay attention to your own understanding.
2. As you read, annotate the text to make a record of your thinking. Highlight challenging words and add notes to record questions and make connections to your own experience.
3. Examine all visual representations carefully. Consider how they go together with the text.
4. After you read, discuss what you have read with others to help you better understand the text.

Name: _____

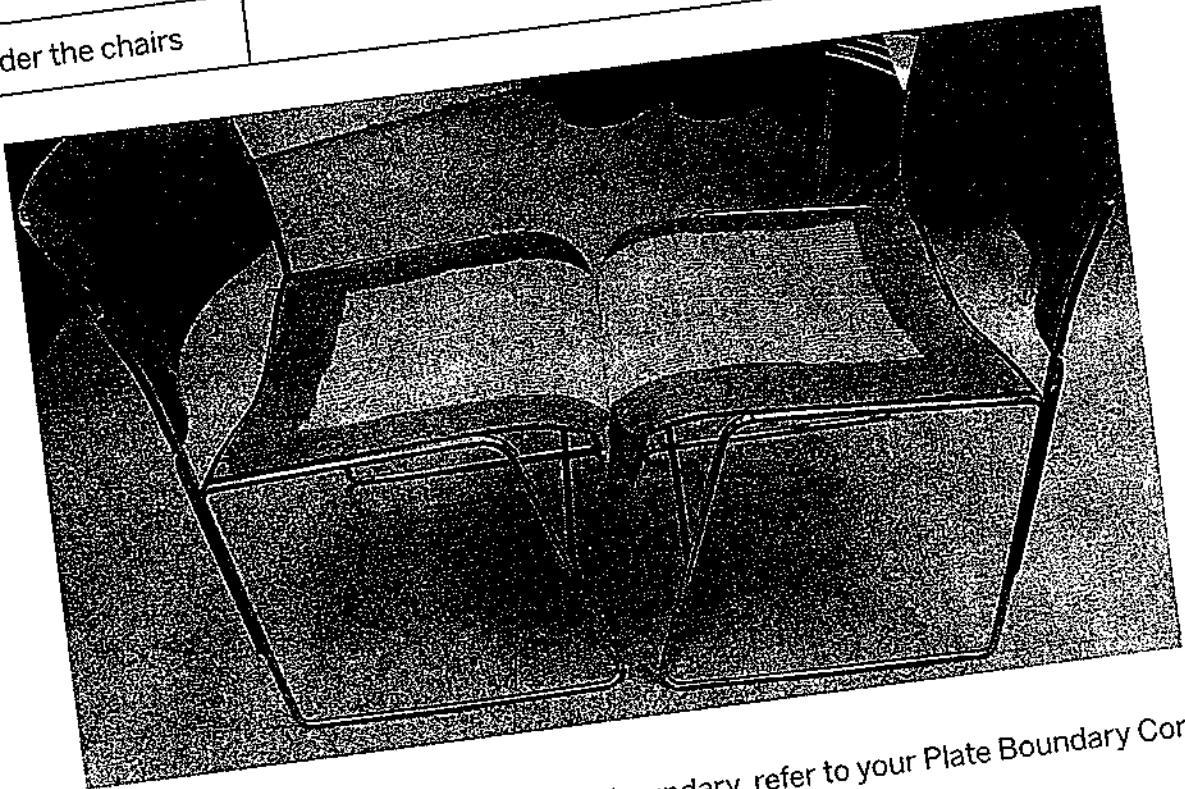
Date: _____

Creating Physical Models of Plate Motion

Part 1: Creating Physical Models

Before you create physical models to represent what happens at convergent and divergent plate boundaries, consider what the parts of the model represent on Earth.

Part of the model	What that represents on Earth
Towels	
Area between the chairs	
Area under the chairs	



As you create your models of each type of plate boundary, refer to your Plate Boundary Comparison Chart and discuss the following questions with your group.

Discussion Questions

- How do the plates move at each type of plate boundary? How can you use the materials to show how this happens?
- What happens to the mantle and the plates at each type of plate boundary? How can you use the materials to show what happens?

Name: _____

Date: _____

Creating Physical Models of Plate Motion (continued)

Part 2: Reflecting on the Investigation Question

Use evidence from the "Listening to Earth" article and your physical models to answer the Investigation Question: *What happens to the plates and the mantle at plate boundaries?*

Try to include the following terms in your response: plate, mantle, convergent boundary, divergent boundary.

Name: _____ Date: _____

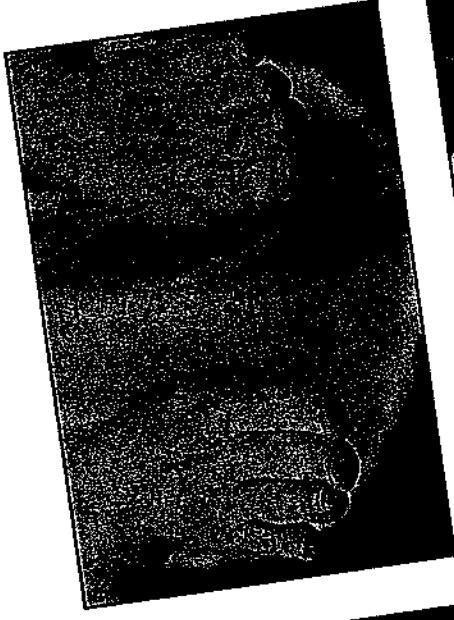
Plate Boundary Comparison Chart

Use multiple sources of evidence to complete this chart comparing two types of plate boundaries.

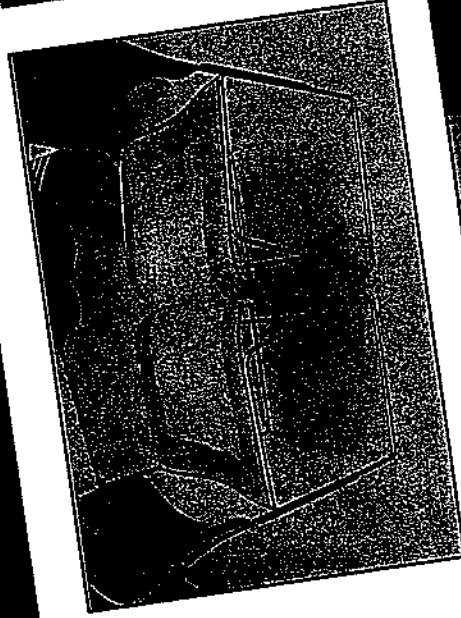
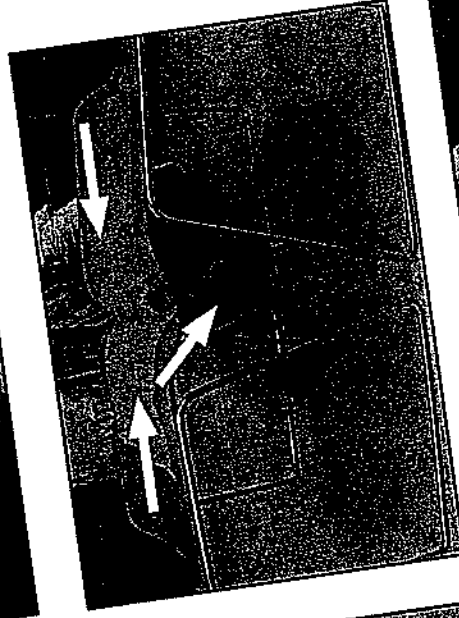
	Divergent plate boundary	Convergent plate boundary
How do plates move at this type of plate boundary?		
How do the plates and mantle interact at this type of plate boundary?		
What landforms are commonly found at or near this type of plate boundary?	<input type="checkbox"/> mid-ocean ridge <input type="checkbox"/> trench <input type="checkbox"/> volcanoes	<input type="checkbox"/> mid-ocean ridge <input type="checkbox"/> trench <input type="checkbox"/> volcanoes
Do earthquakes occur at this type of plate boundary?	<input type="checkbox"/> yes <input type="checkbox"/> no	<input type="checkbox"/> yes <input type="checkbox"/> no
Is there volcanic activity at this type of plate boundary?	<input type="checkbox"/> yes <input type="checkbox"/> no	<input type="checkbox"/> yes <input type="checkbox"/> no

Plate Motion Model Reference

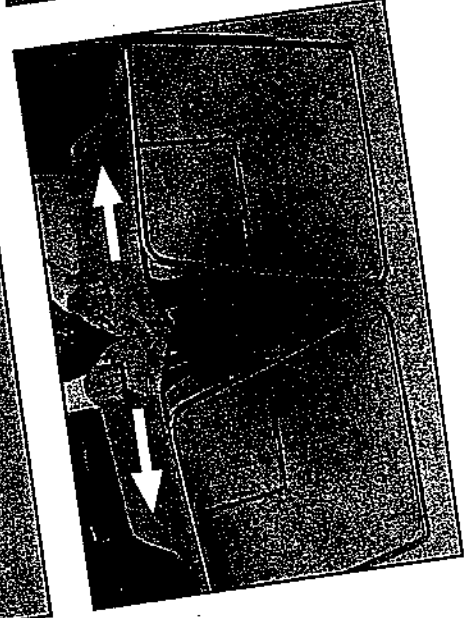
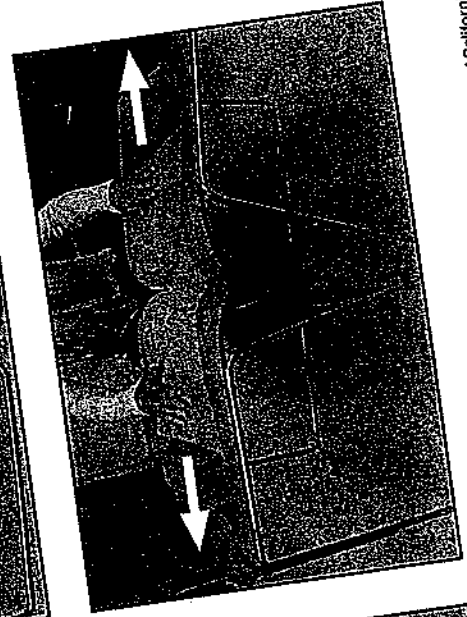
Using hands to model divergent plate motion



Modeling a convergent plate boundary



Modeling a divergent plate boundary



Name: _____

Date: _____

Lesson 2.4: Modeling Plate-Mantle Interactions

How can we really understand what is taking place at plate boundaries? You created simple physical models in the previous lesson. The Sim is a more complex model of plate boundaries, and it will help you investigate plate-mantle interactions more closely. Today, you will show your understanding of what is taking place by creating visual models. Then you will use the Sim to expand your understanding before adding more detail to your models.

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?

Key Concepts

- Earth's plates move on top of a soft, solid layer of rock called the mantle.

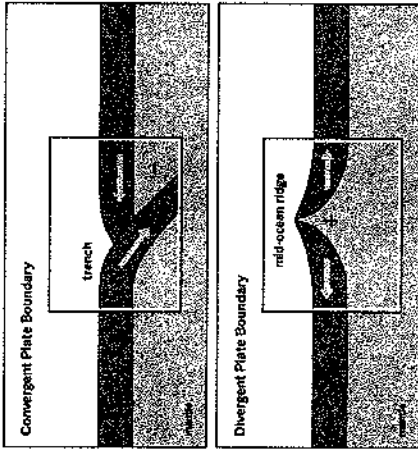
Vocabulary

- convergent
- cross section
- divergent
- earthquake
- mantle
- mid-ocean ridge
- outer layer
- plate
- plate boundary
- trench
- volcanic activity

Digital Tools

- *Plate Motion Simulation*

Modeling Convergent and Divergent Plate Boundaries



Key Concepts

- At divergent plate boundaries, rock rises from the mantle and hardens, adding new solid rock to the edges of both plates.
- At convergent plate boundaries, one plate moves underneath the other plate and sinks into the mantle.

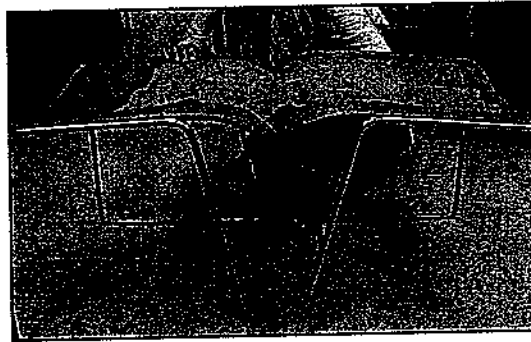
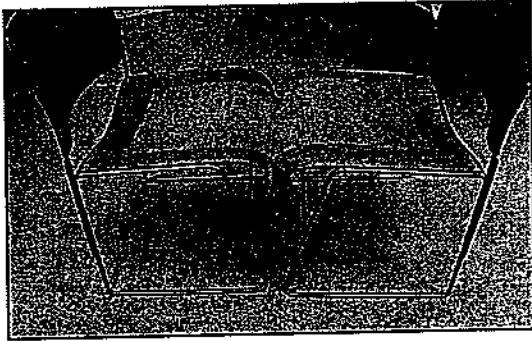
Name: _____

Date: _____

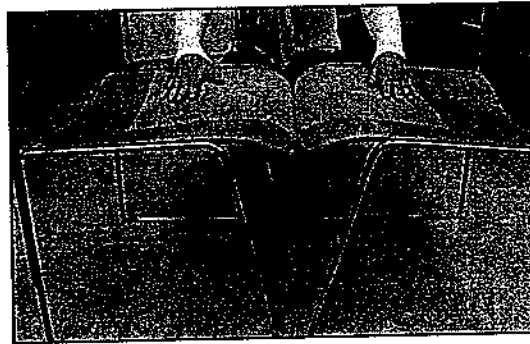
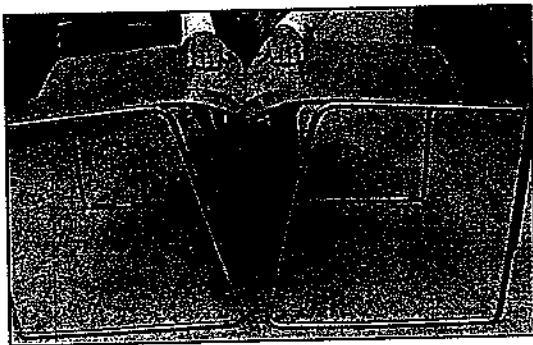
Warm-Up

In the previous lesson, you read about convergent and divergent plate boundaries. You also made physical models of these types of boundaries using towels and chairs or desks. The photos below show cross-section views of physical models similar to the ones you created.

Convergent Plate Boundary



Divergent Plate Boundary



How did the physical models make it difficult to show what happens to the plates and mantle at plate boundaries?

Name: _____

Date: _____

Explaining What Happens at Plate Boundaries

Modeling Convergent and Divergent Plate Boundaries

Use the Modeling Tool activity: Modeling Convergent and Divergent Plate Boundaries on the next two pages to show your thinking about what happens at two types of plate boundaries.

Goal: Show what happens to the plates and the mantle at plate boundaries.

Do:

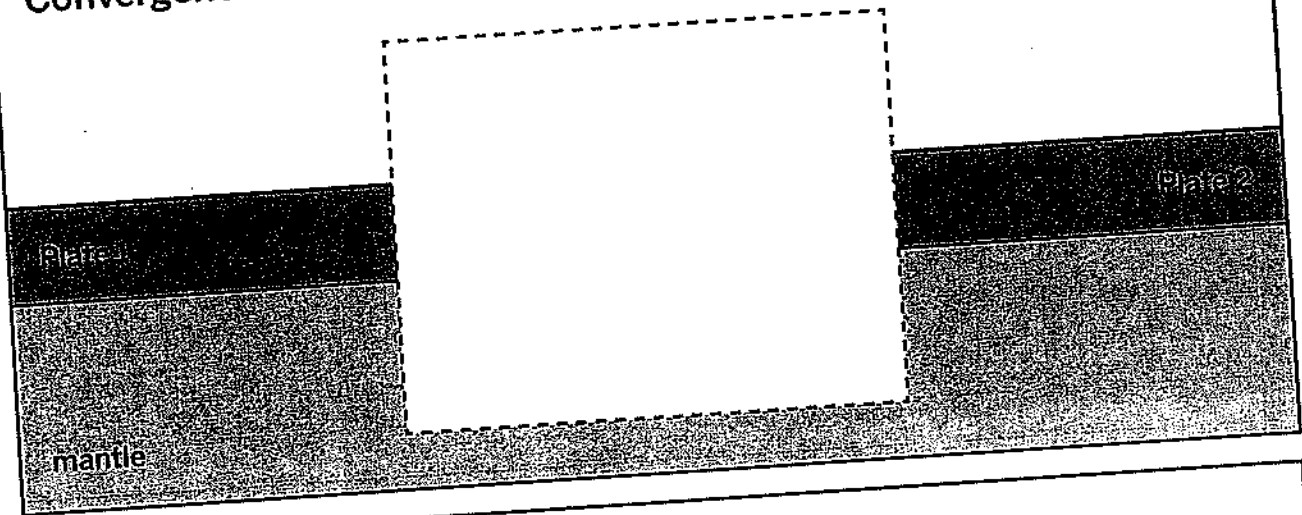
- For each plate boundary type, choose the cross section on the second page that best shows what is happening where Plate 1 and Plate 2 meet.
- Cut out the cross sections you chose and glue them in the appropriate boxes.
- In the cross sections that you added, add arrows to show the direction each plate is moving at each plate boundary.

Name: _____

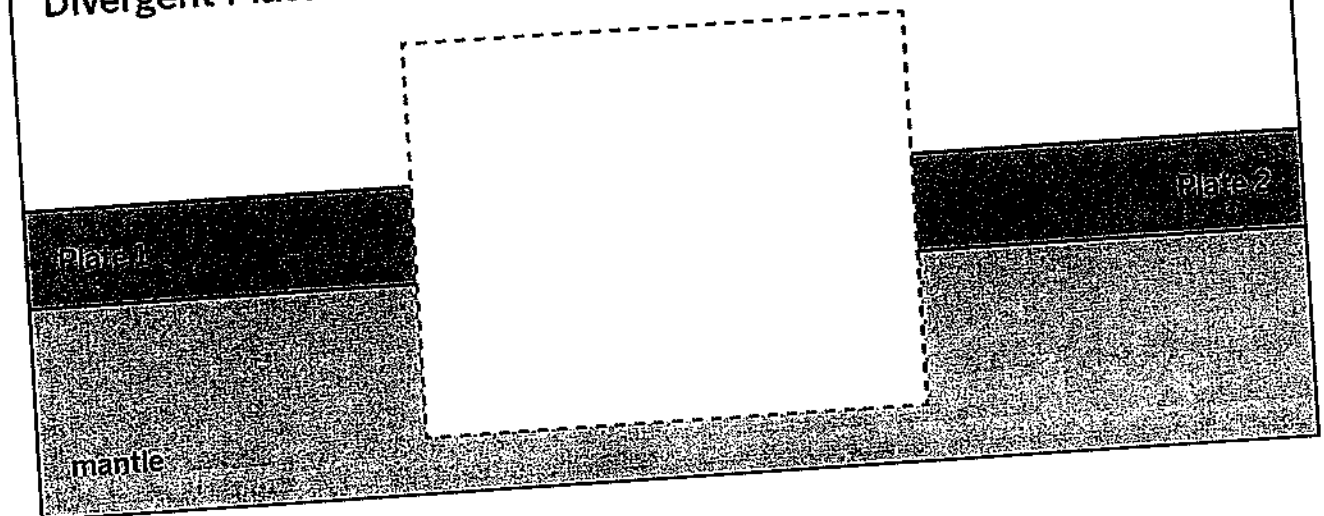
Date: _____

Explaining What Happens at Plate Boundaries (continued)

Convergent Plate Boundary



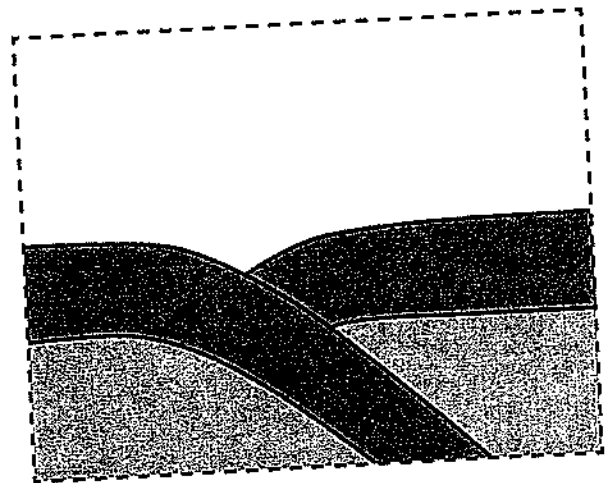
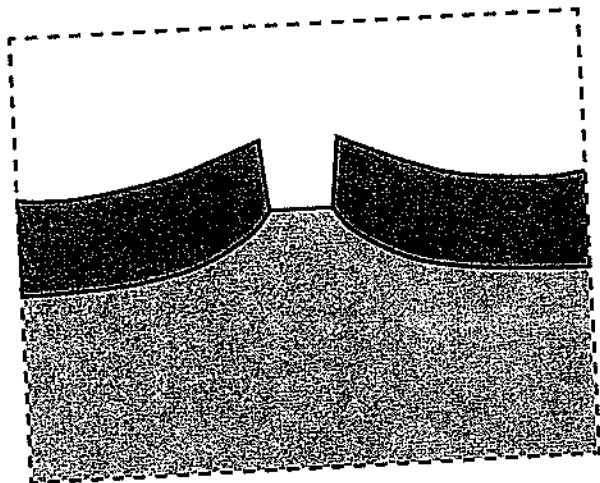
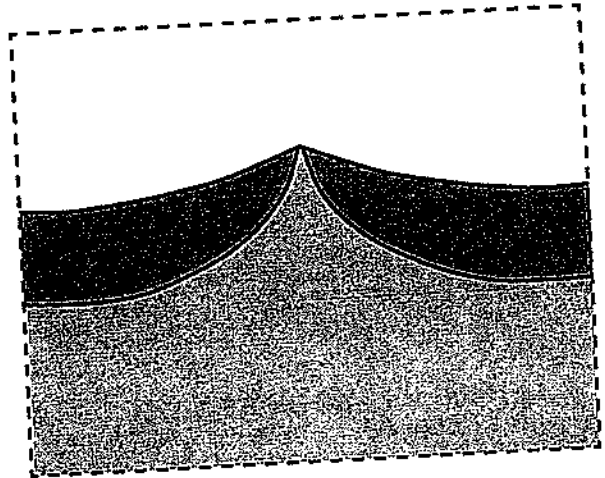
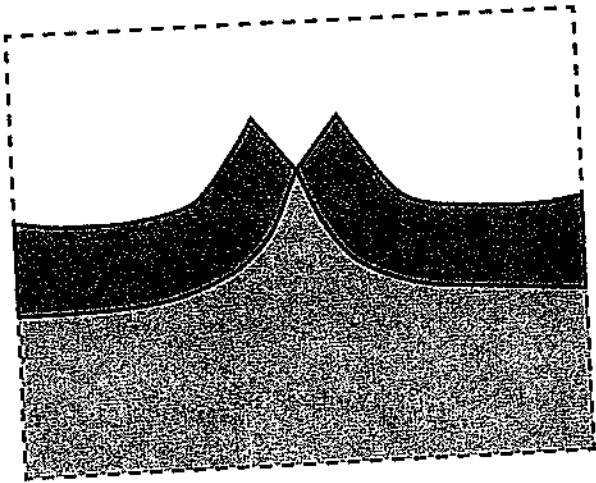
Divergent Plate Boundary



Name: _____ Date: _____

Explaining What Happens at Plate Boundaries (continued)

Cross Section Options



Name: _____

Date: _____

Exploring Plate Boundaries in the Sim

Part 1

Plate-mantle interactions change Earth's plates over time. In some places, plate material is added to the edges of both plates, and in others, one plate sinks into the mantle. With your partner, use the Sim to learn more about how the plates interact with the mantle at plate boundaries.

Mission: Show the differences in the types of interaction between the mantle and plate by creating two scenarios:

- Create one scenario in which rock is added to the edges of both plates.
- Create another scenario in which one plate sinks into the mantle.

Predictions

1. I think that rock from the mantle is added to the edges of both plates at (check one)

convergent plate boundaries.

divergent plate boundaries.

2. I think that one plate sinks into the mantle and is destroyed at (check one)

convergent plate boundaries.

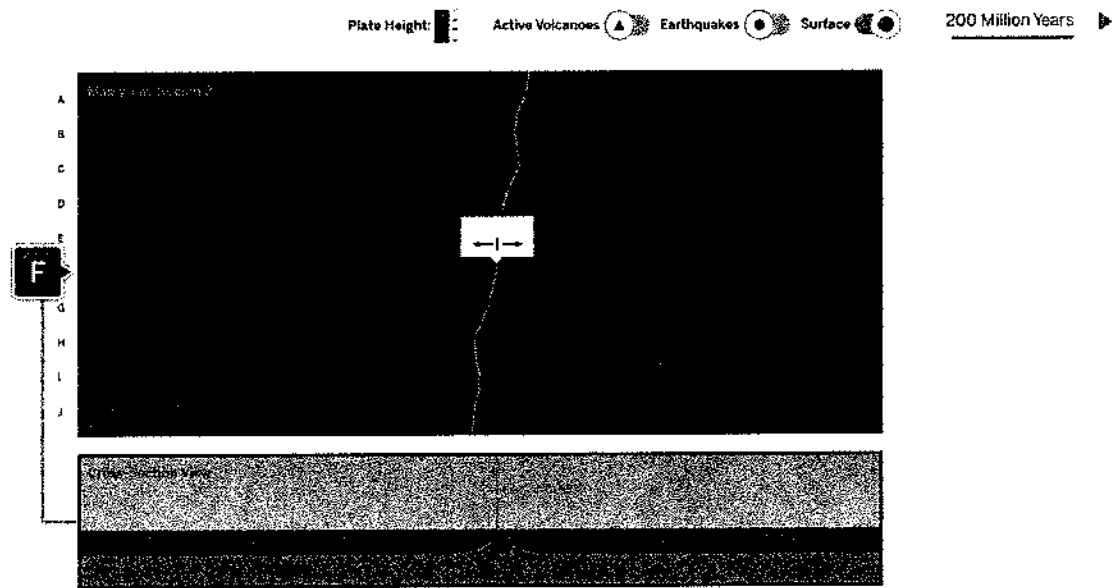
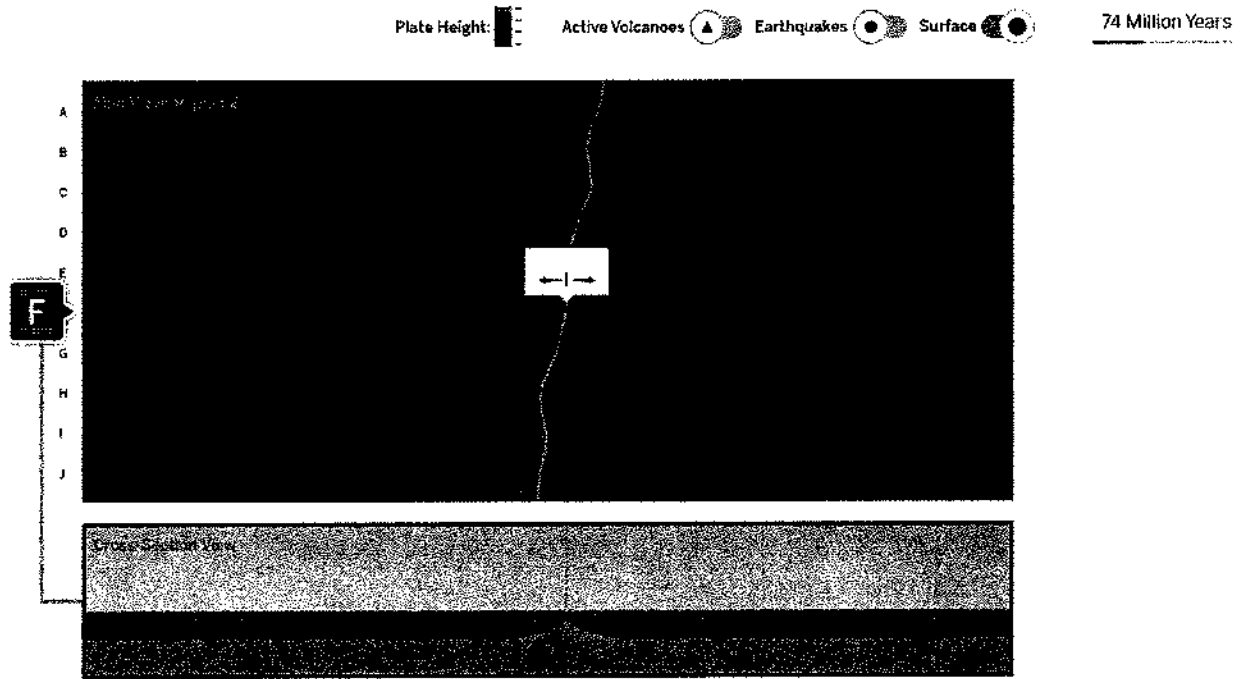
divergent plate boundaries.

Instructions

1. Open the *Plate Motion* Sim.
2. Select Region 2.
3. Set up the region so that rock from the mantle will be added to the edges of both plates or a plate will sink into the mantle at the plate boundary. Press SET BOUNDARY to choose the plate boundary type.
4. Press RUN and observe what is happening in the Cross-Section View. Can you see rock being added to the edges of the plates or one plate sinking into the mantle?
5. Press BUILD and repeat Steps 3 and 4 for the other scenario.
6. Based on your observations, complete the statements on the next page.

Lesson 2.4

Divergent boundaries



Convergent Boundaries

Plate Height: Active Volcanoes Earthquakes Surface 0 Million Years ▶

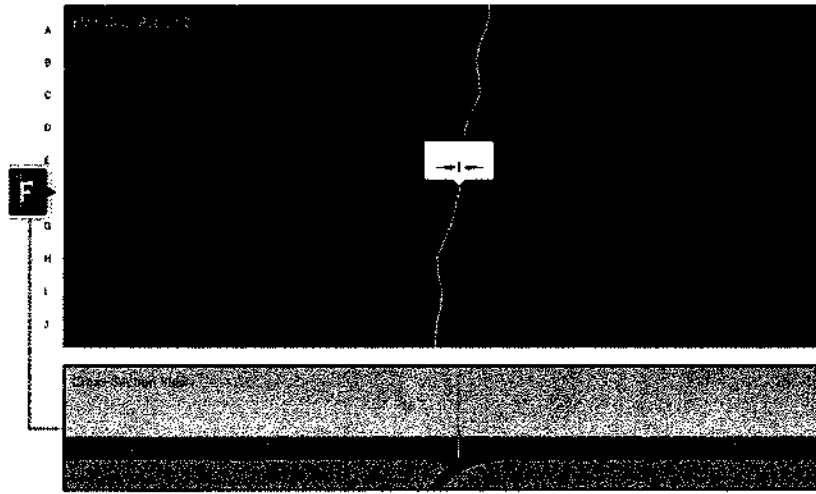
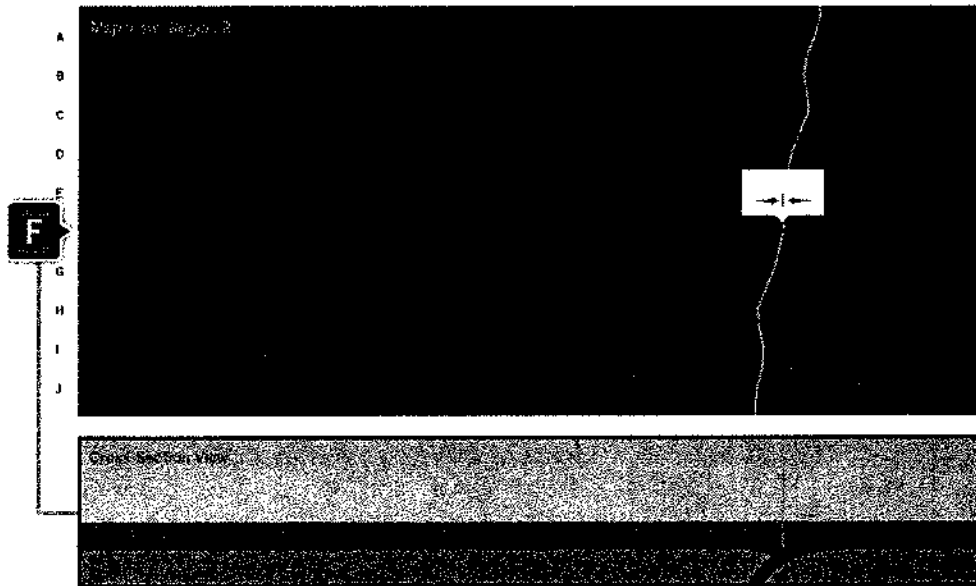


Plate Height: Active Volcanoes Earthquakes Surface 172 Million Years ▶



Name: _____ Date: _____

Exploring Plate Boundaries in the Sim (continued)

Observations

1. I saw that rock from the mantle is added to the edges of both plates at (**convergent / divergent**) plate boundaries, where the plates move (**toward / away from**) each other.
2. I saw that one plate sinks into the mantle and is destroyed at (**convergent / divergent**) plate boundaries, where the plates move (**toward / away from**) each other.

Part 2

With your partner, use the Sim to gather more evidence about what happens at plate boundaries. By learning more about what happens at convergent and divergent plate boundaries, we will be able to determine which type of boundary is between the South American Plate and African Plate.

1. Open the Sim.
2. Open Region 2. Use the Add Rock tool to add continents to the map.
3. Press SET BOUNDARY and select Divergent as the plate boundary type. Then press RUN.
4. Toggle on earthquakes and volcanoes.
5. Observe whether earthquakes and volcanoes occur at this plate boundary. What can you see in the Map View and in the Cross-Section View?
6. Observe how the Cross-Section View changes. What landforms are associated with this type of plate boundary?
7. Repeat your observations with a convergent plate boundary.
8. Complete the Plate Boundary Comparison Chart based on your observations.

Lesson 2.4 Divergent Boundaries

Plate Height: Active Volcanoes Earthquakes Surface

97 Million Years ▶

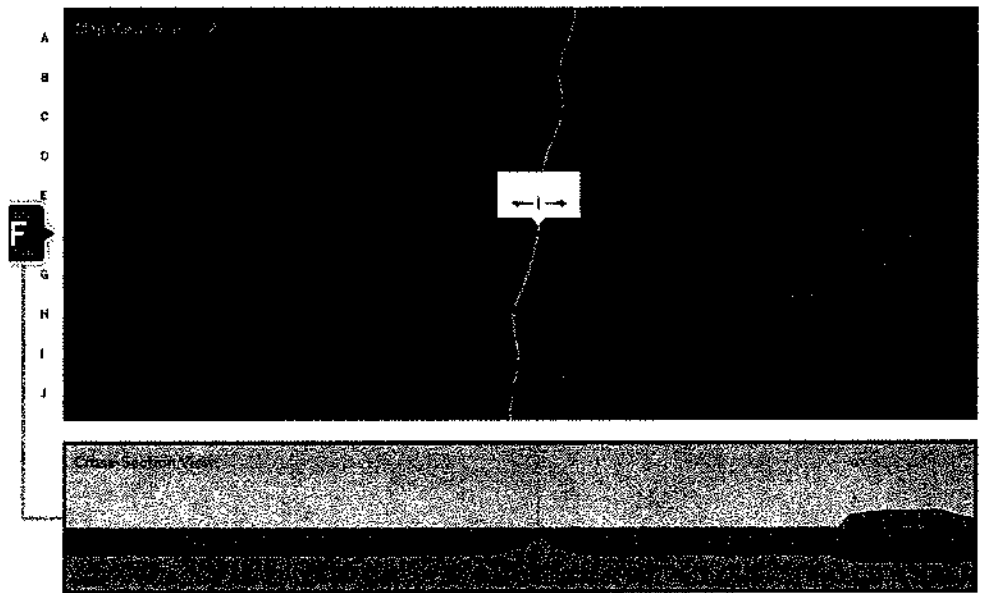
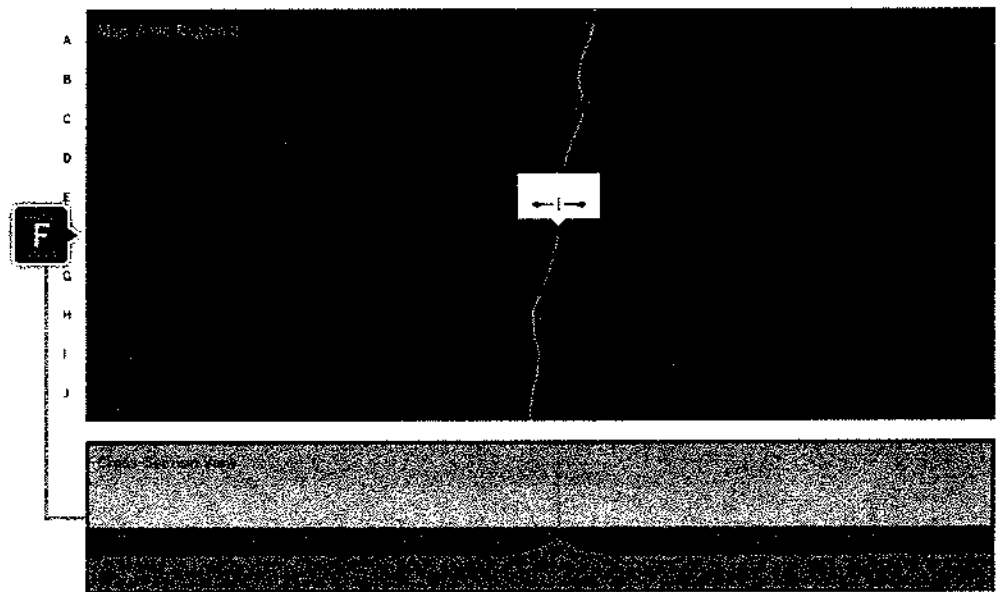


Plate Height: Active Volcanoes Earthquakes Surface

187 Million Years ▶



Convergent boundaries

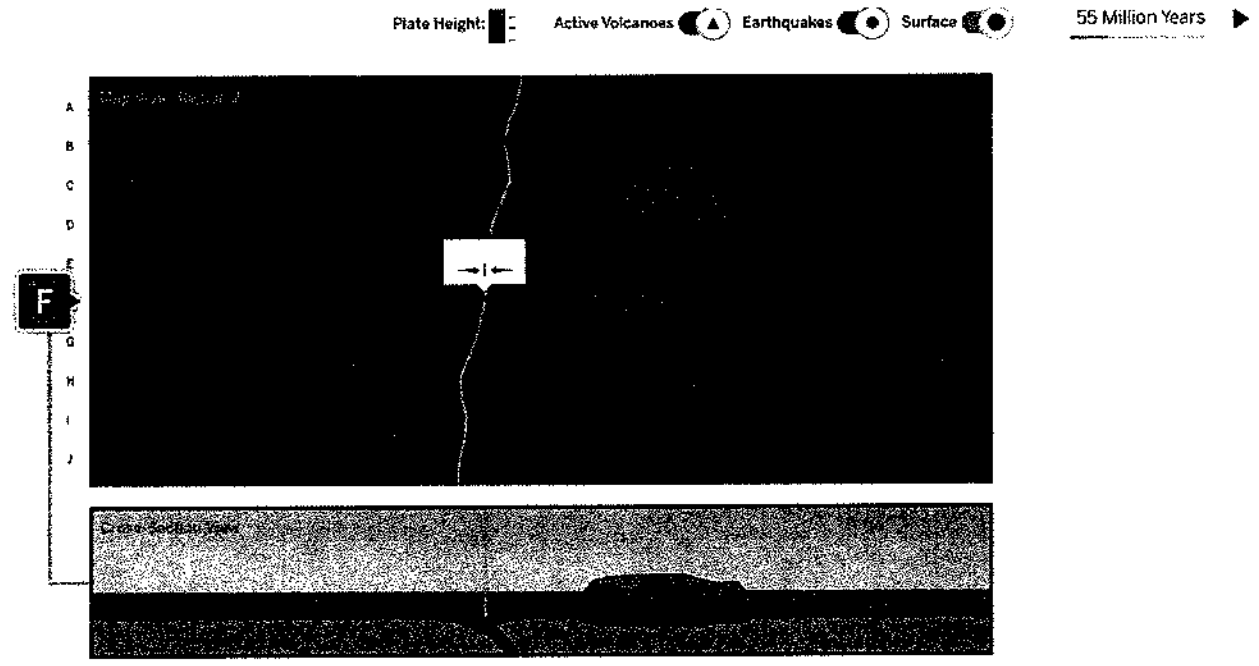
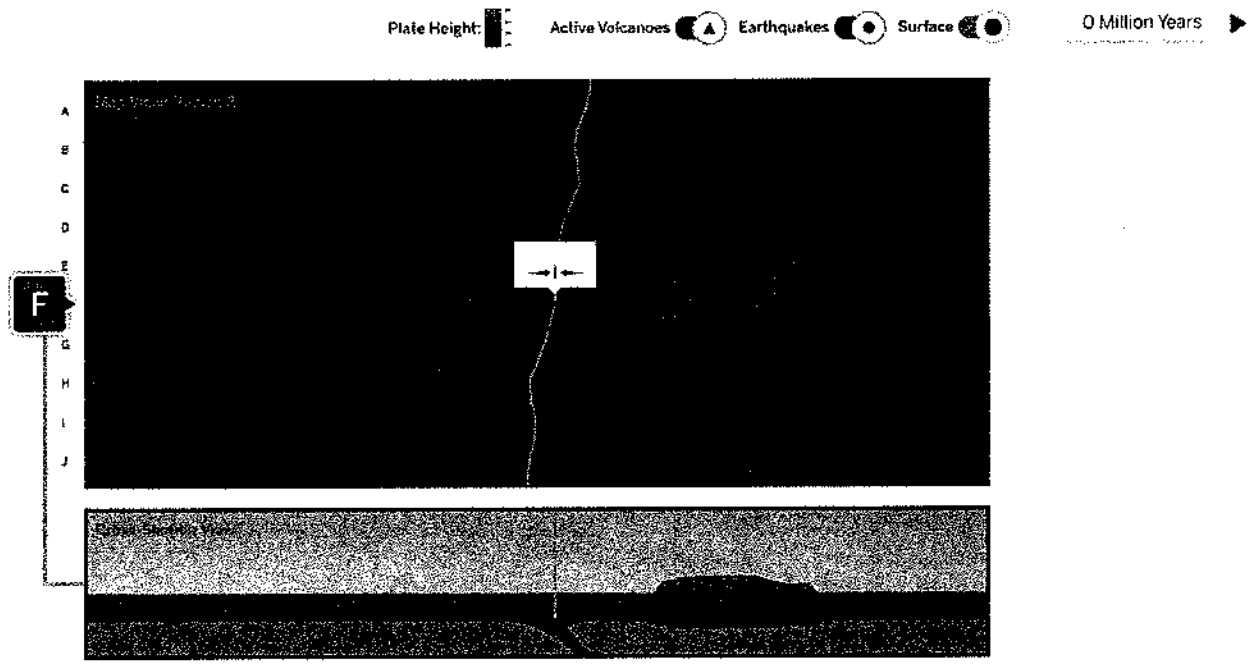



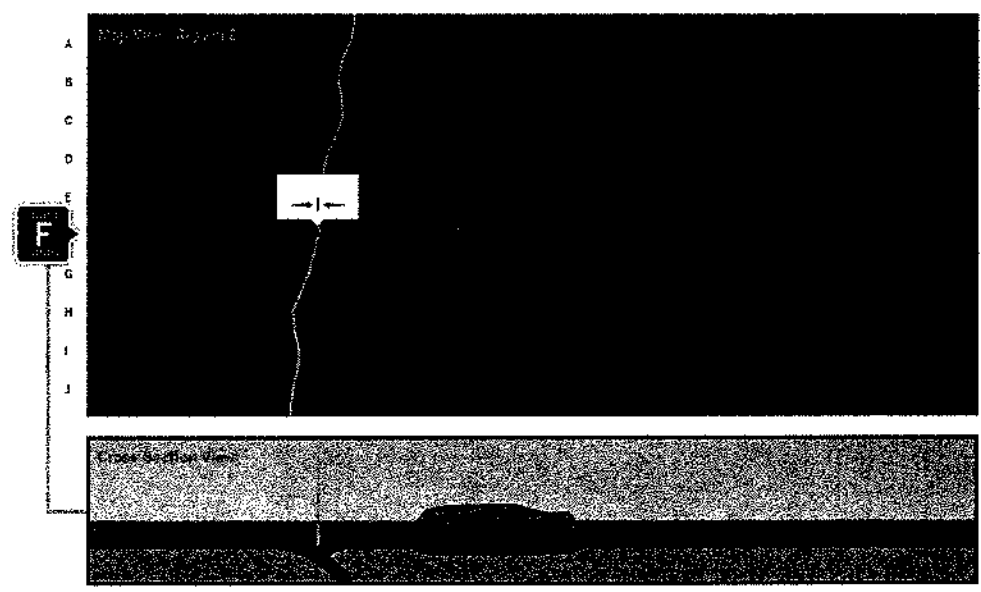
Plate Height: 

Active Volcanoes 

Earthquakes 

Surface 

173 Million Years 



Name: _____ Date: _____

Revising Models of Plate Boundaries

Return to your Modeling Tool activity: Modeling Convergent and Divergent Plate Boundaries on pages 44–45 and revise your models based on your observations in the Sim.

Goal: Show what happens to the plates and the mantle and what landforms are found at plate boundaries.

Do:

- Label which landform forms at each plate boundary (trench or mid-ocean ridge).
- Label where rock from the mantle is added to the edges of both plates with a plus sign.
- Label where the plate sinks into the mantle and is destroyed with a minus sign.

Tip:

- Refer to your Plate Boundary Comparison Chart!

Name: _____

Date: _____

Lesson 2.5: Identifying Plate Motion at a Plate Boundary

We know that the *Mesosaurus* fossils were once together and are now far apart, and we know that plate motion is responsible for this. Are you ready to make a final determination about which type of plate boundary is between the South American Plate and African Plate? By the end of this lesson, you will be! Knowing which type of plate boundary is between these plates will help you figure out how the fossils got so far apart.

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?

Key Concepts

- Earth's plates move on top of a soft, solid layer of rock called the mantle.
- At divergent plate boundaries, rock rises from the mantle and hardens, adding new solid rock to the edges of both plates.
- At convergent plate boundaries, one plate moves underneath the other plate and sinks into the mantle.

Vocabulary

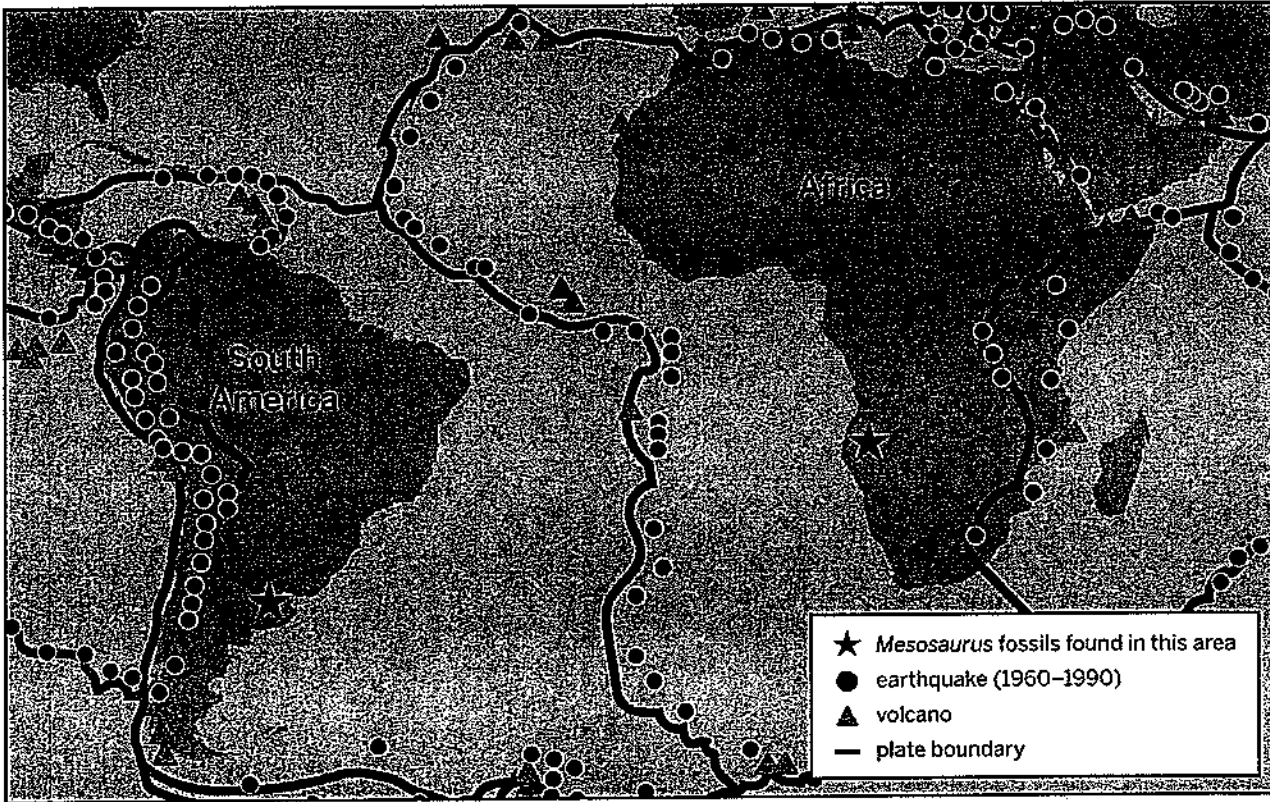
- | | | |
|-----------------|-------------------|---------------------|
| • analyze | • earthquake | • pattern |
| • claim | • evidence | • plate |
| • convergent | • mantle | • plate boundary |
| • cross section | • mid-ocean ridge | • trench |
| • divergent | • outer layer | • volcanic activity |

Name: _____

Date: _____

Warm-Up

This map shows the plate boundary where the South American Plate and African Plate meet, with new evidence added.



Do you notice any patterns on this map? Describe them here.

From this evidence, can you tell if this plate boundary is divergent or convergent?

Name: _____ Date: _____

Interpreting Plate Boundary Evidence

To: Student Geologists

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

Subject: New Evidence

**MUSEUM OF
WEST NAMIBIA**

We just received new evidence from a group of scientists studying the ocean floor at the boundary between the South American Plate and African Plate. The scientists told us that a mid-ocean ridge called the Mid-Atlantic Ridge is located along this plate boundary. We hope you will find this new evidence helpful as you work to determine how the South American Plate and African Plate moved. We eagerly await hearing about your findings!

Examine the Plate Boundary Evidence Map on the previous page, and discuss the following questions with your partner.

Discussion Questions

- Which type of plate boundary do you think this is? How are the plates moving in relation to each other?
- Which piece of evidence was most convincing in helping you determine the type of plate boundary between these two plates?

Name: _____

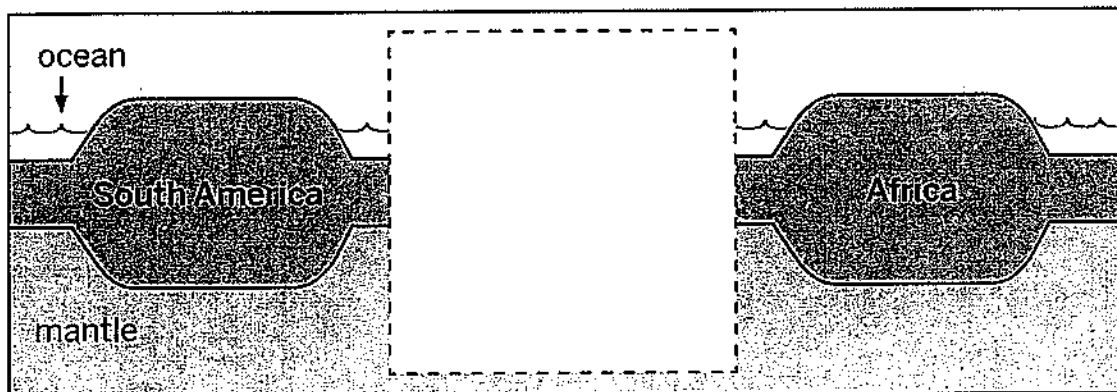
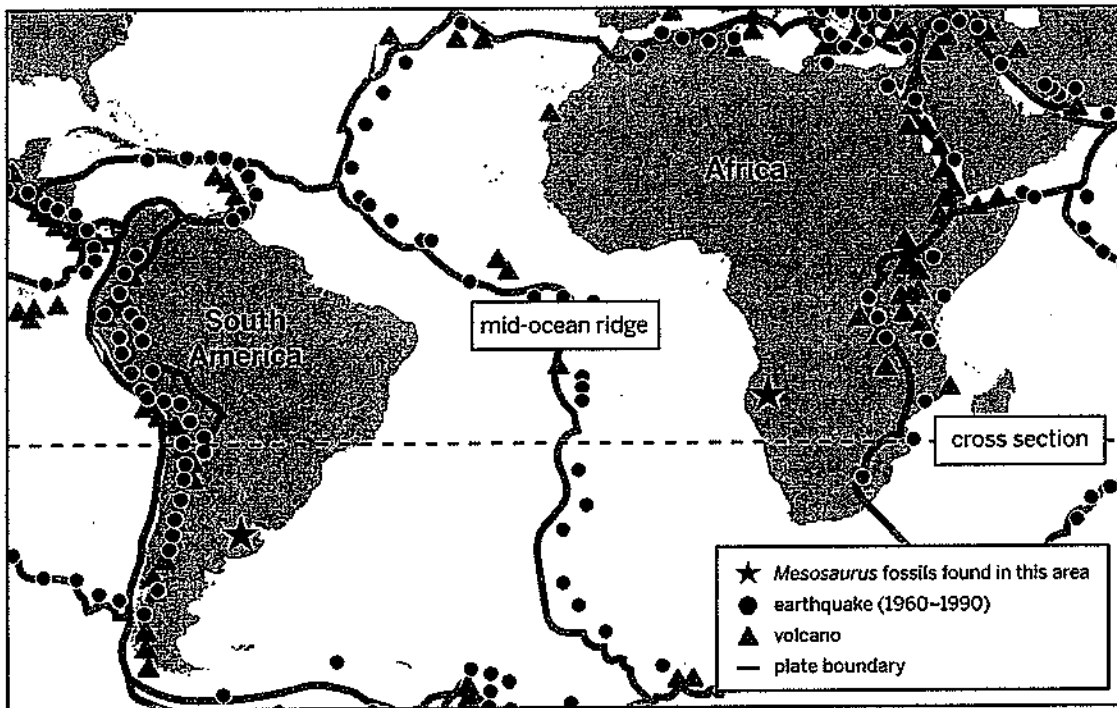
Date: _____

Modeling a Divergent Plate Boundary

Goal: Show how the plates and the mantle interact at the plate boundary between the South American Plate and African Plate.

Do:

- Draw in the missing part of the cross section below the map to show what happens where the South American Plate and African Plate meet.
- Add arrows to the map and to the cross section to show the direction in which each plate is moving.
- In the cross section, add a plus sign to show where rock from the mantle is added to the plates.



Name: _____

Date: _____

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

Answer the Chapter 2 Question using the evidence you have collected in this unit so far. You may want to include the words in the Word Bank in your response.

Word Bank

away	together	continent	earthquake	ocean
outer layer	mantle	plate	plate boundary	convergent
divergent	mid-ocean ridge	trench	volcanic activity	

How did the South American Plate and African Plate move?

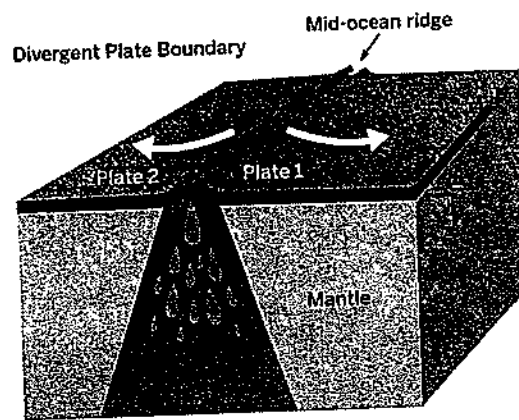
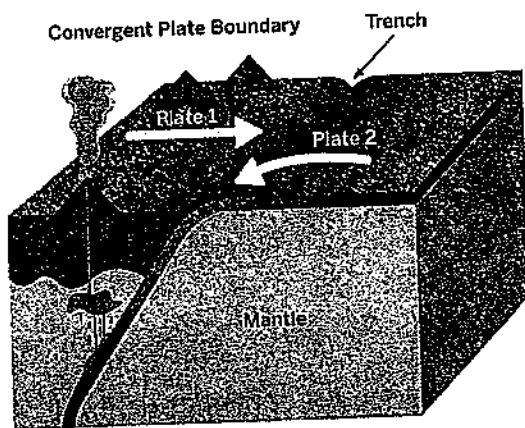
Be sure to include what type of plate boundary is between these plates and how you can tell. Use evidence to support your response.

Name: _____ Date: _____

Family Homework Experience: Explaining Convergent and Divergent Plate Boundaries at Home

The two cross-section diagrams below show what happens at both convergent and divergent plate boundaries. Use these diagrams to explain to a member of your family what happens at each type of plate boundary, and encourage your family member to ask you questions as well. You may need to explain the following ideas so that your family member fully understands what you are explaining:

- What are Earth's plates?
- What is the mantle?
- What happens at a convergent plate boundary?
- What happens at a divergent plate boundary?



1. What are two questions your family member asked you?

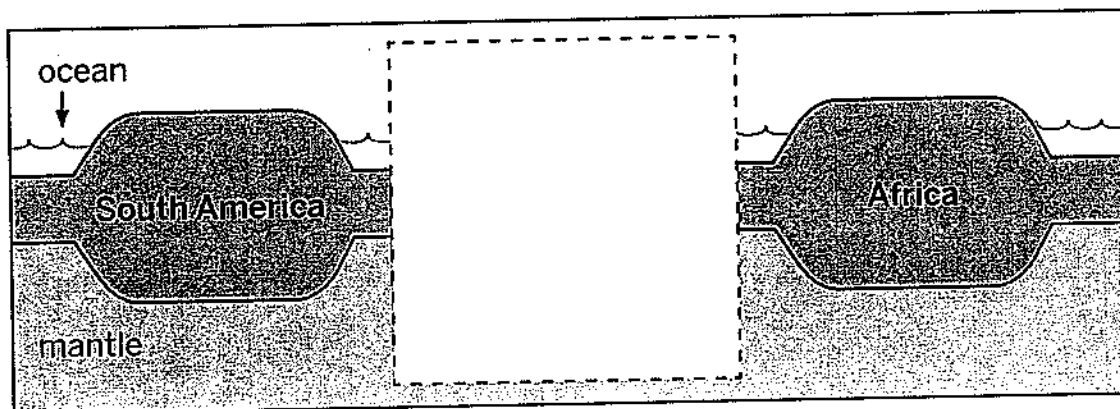
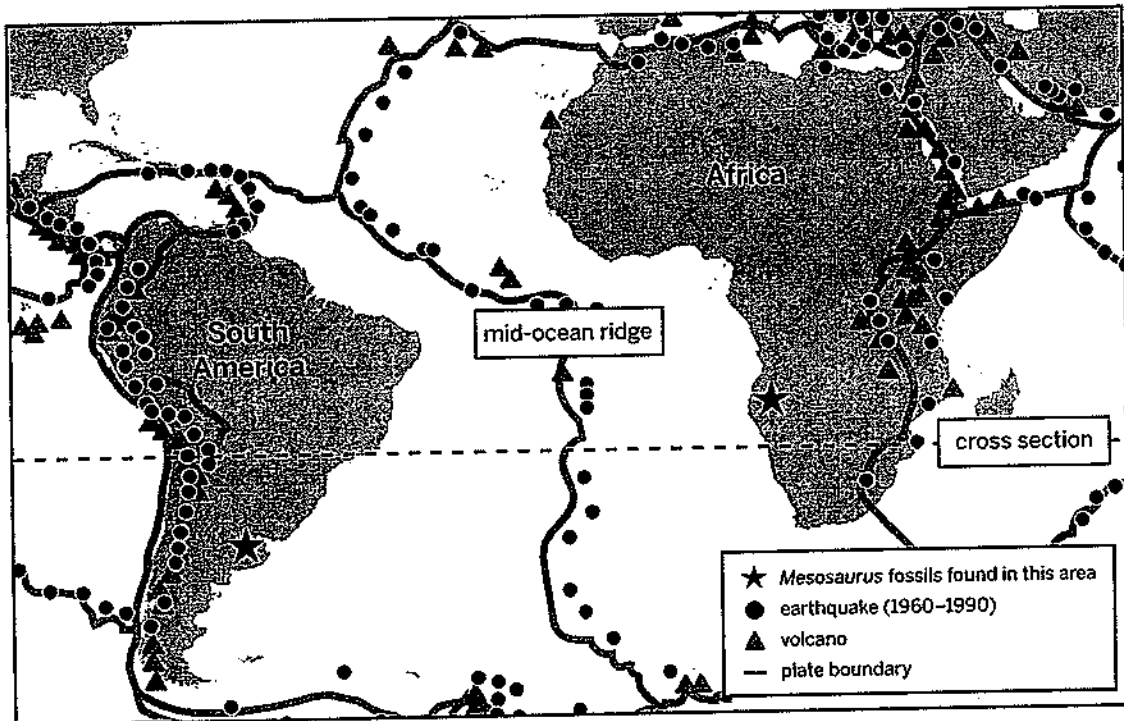
2. What are two ideas you explained to your family member?

Modeling a Divergent Plate Boundary

Goal: Show how the plates and the mantle interact at the plate boundary between the South American Plate and African Plate.

Do:

- Draw in the missing part of the cross section below the map to show what happens where the South American Plate and African Plate meet.
- Add arrows to the map and to the cross section to show the direction in which each plate is moving.
- In the cross section, add a plus sign to show where rock from the mantle is added to the plates.



DO NOT USE ANY RESOURCE

Plate Motion Critical Juncture Assessment

Name: _____ Date: _____

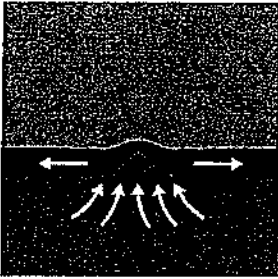
TO COMPLETE TEST

Multiple-Choice Questions



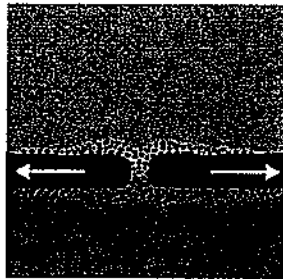
1. Which statement best describes Earth's outer layer underneath the surface in the image?

- (a) Underneath the soil, Earth's outer layer is made of water.
- (b) Underneath both the soil and the ocean, Earth's outer layer is made of sand and water.
- (c) Underneath the soil, Earth's outer layer is made of hard, solid rock. Underneath the ocean, Earth's outer layer is made of sand.
- (d) Underneath both the soil and the ocean, Earth's outer layer is made of hard, solid rock.



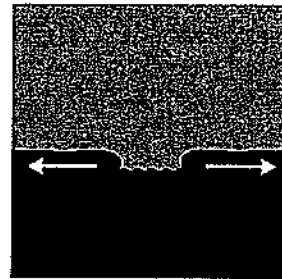
Soft, solid rock from underneath the plates rose and hardened, adding solid rock to the edges of both plates.

A



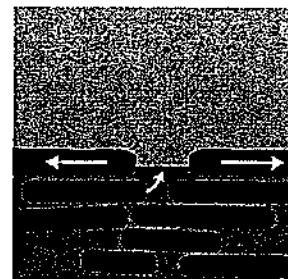
Sand and dirt filled in the gap that was created by the plates moving apart.

B



Ocean water filled in the gap that was created by the plates moving apart.

C

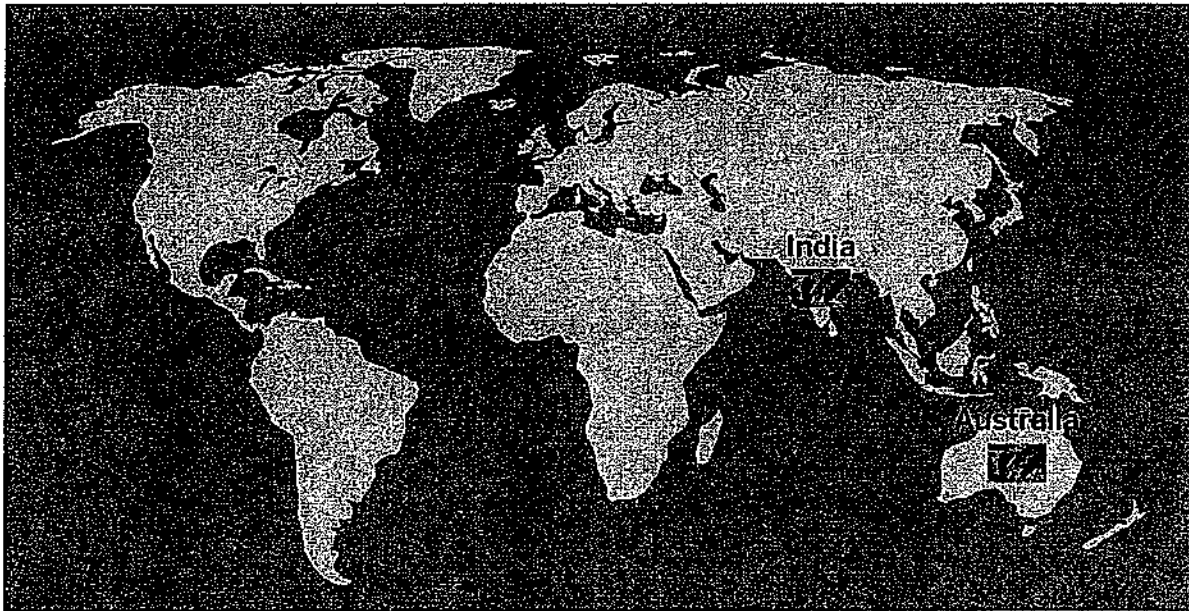


A new plate from underneath filled in the gap that was created by the plates moving apart.

D

2. Dr. Choi and his team of geologists have been studying GPS data that shows that two plates moved apart. *Which diagram shows what happened between the two plates as they moved away from each other?*

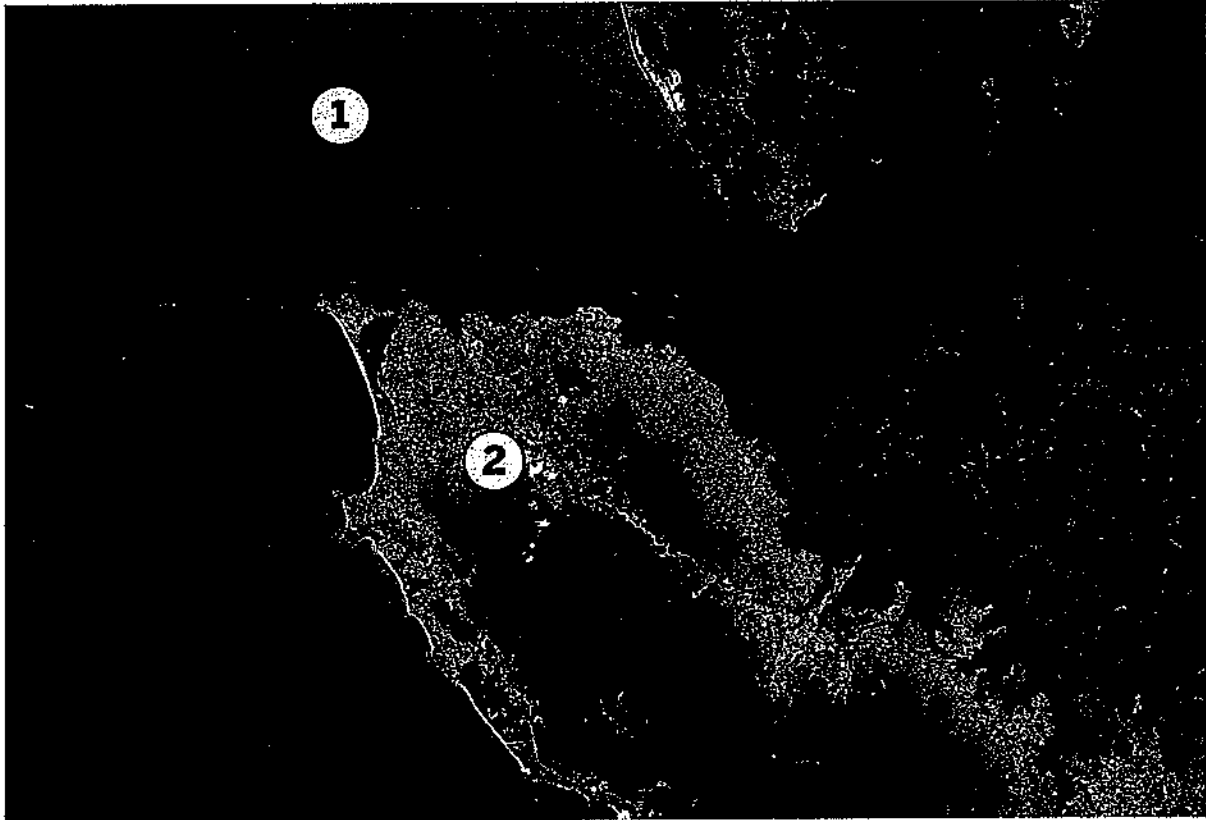
- (a) **Diagram A:** Soft, solid rock from underneath the plates rose and hardened, adding solid rock to the edges of both plates.
- (b) **Diagram B:** Sand and dirt filled in the gap that was created by the plates moving apart.
- (c) **Diagram C:** Ocean water filled in the gap that was created by the plates moving apart.
- (d) **Diagram D:** A new plate from underneath filled in the gap that was created by the plates moving apart.



Glossopteris
fossils

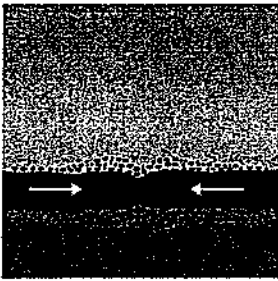
3. Fossil remains of *Glossopteris* (an extinct plant with large leaves) have been discovered in India and Australia. When they were living, all the *Glossopteris* were located together on land, but now the *Glossopteris* fossils are separated by an ocean. What could explain how these fossils got so far apart?

- (a) India and Australia are parts of different plates. The plates slowly moved apart as new plates from underneath got added between them over millions of years.
- (b) India and Australia are parts of different plates. The plates slowly moved far apart as soft, solid rock from underneath got added to the edges of the plates over millions of years.
- (c) India and Australia are parts of different plates. The plates floated away from each other across the ocean.
- (d) India and Australia are parts of different plates. The plates were sometimes pushed far apart by earthquakes, and soft, solid rock from underneath got added to the edges of the plates.



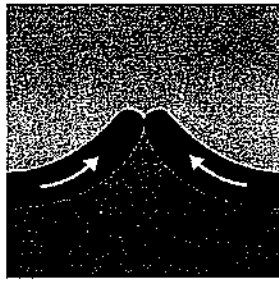
4. A team of geologists wants to study hard, solid rock under the surface of Earth. The team is considering drilling down in the North Atlantic Ocean (1) and in Sierra Leone (2). *Where will the team find hard, solid rock?*

- (a) only under 2, because Earth's outer layer is made of hard, solid rock under continents but not under the ocean
- (b) under 1 and 2, because Earth's entire outer layer is made of hard, solid rock
- (c) neither under 1 nor 2, because there is water under both places
- (d) neither under 1 nor 2, because there is sand and gravel under both places



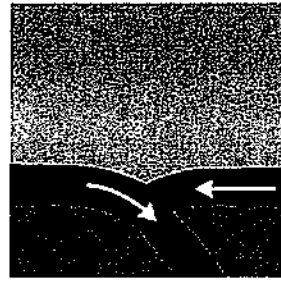
Two plates are hitting each other, and the plates are breaking into pieces, creating sand.

A



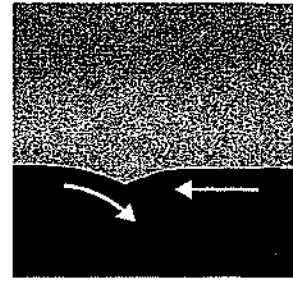
Two plates are pushing against each other, causing the edges to bend upward.

B



One plate is going underneath the other plate and sinking into the soft rock below.

C

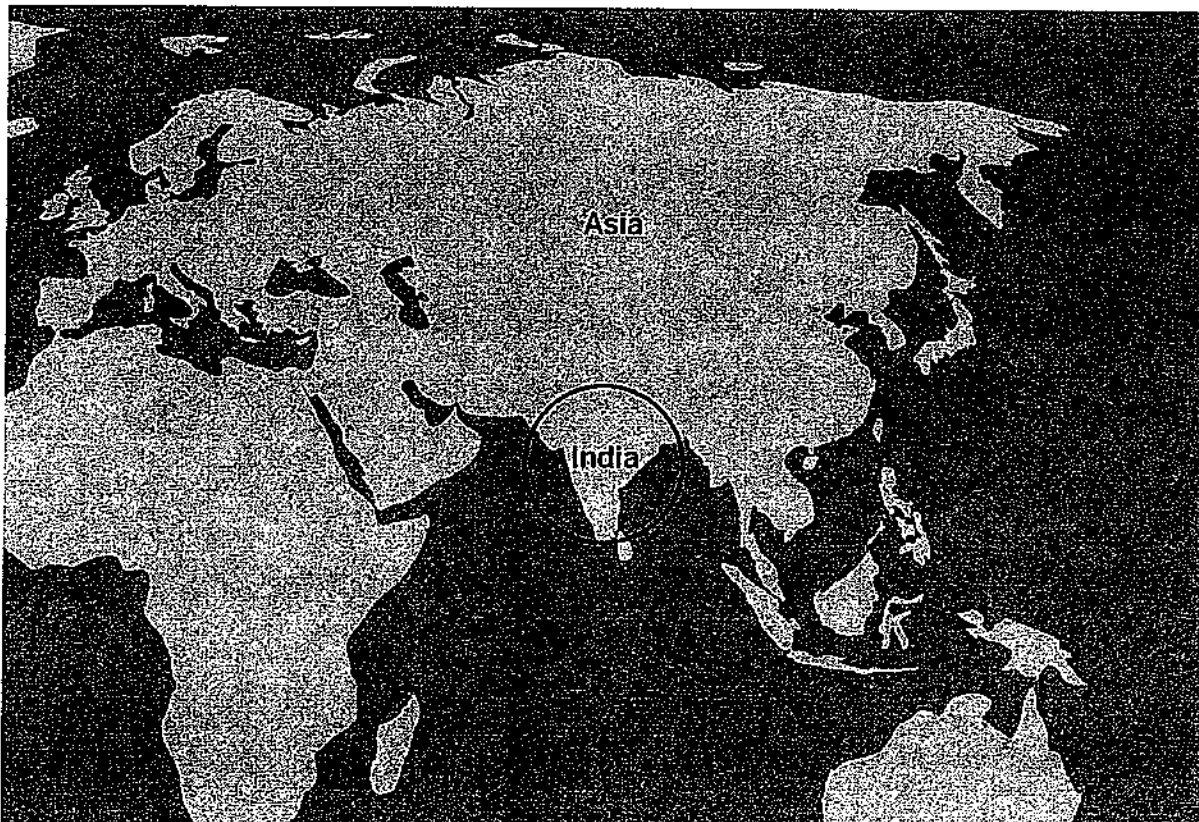


One plate is going underneath the other plate and sinking into the ocean below.

D

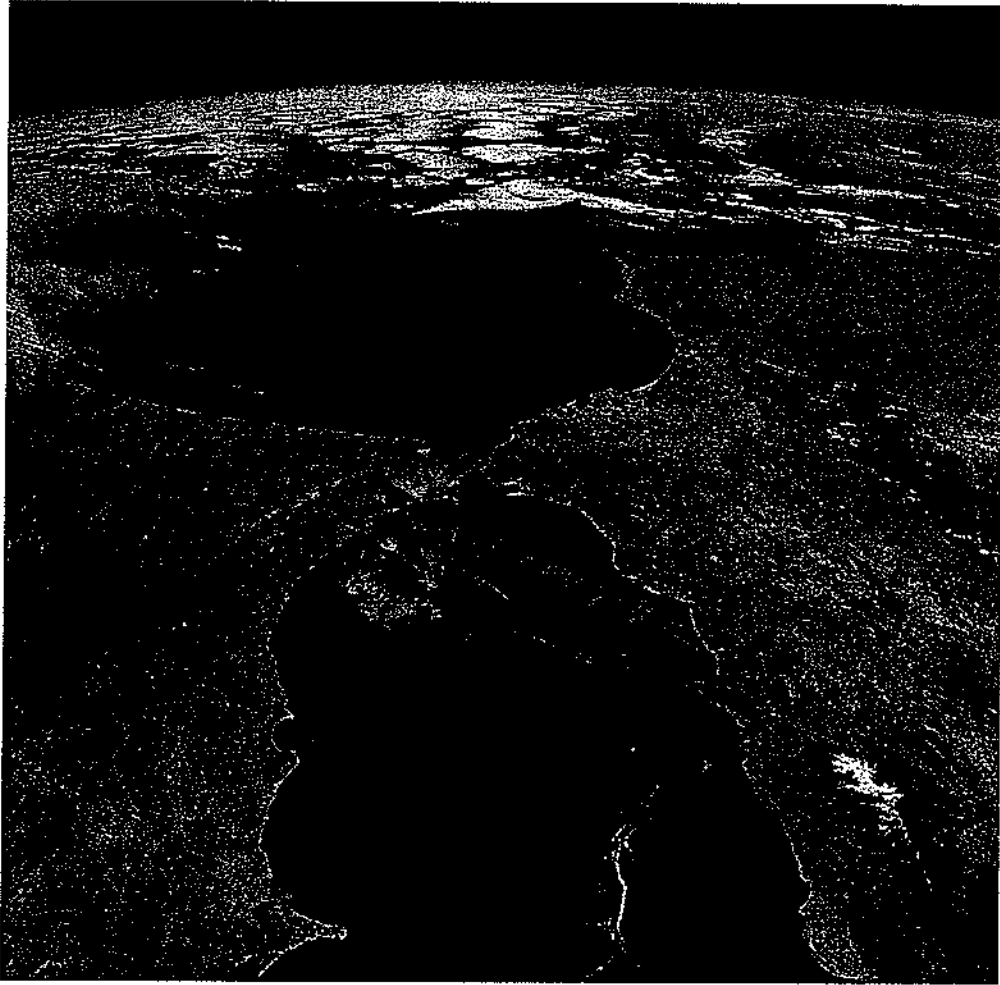
5. Dr. Steiner and her team have been using GPS to track two plates that are moving toward each other. Which diagram shows what is happening at the place where the plates are moving toward each other?

- (a) **Diagram A:** Two plates are hitting each other, and the plates are breaking into pieces, creating sand.
- (b) **Diagram B:** Two plates are pushing against each other, causing the edges to bend upward.
- (c) **Diagram C:** One plate is going underneath the other plate and sinking into the soft rock below.
- (d) **Diagram D:** One plate is going underneath the other plate and sinking into the ocean below.



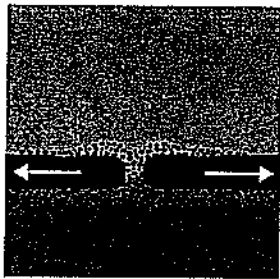
6. India, a country that is part of Asia, was not always connected to the Asian continent. *How did India come to be part of Asia?*

- (a) India and Asia are parts of different plates. The plates were sometimes pushed toward each other by earthquakes, and one plate went under the other plate into soft, solid rock.
- (b) India and Asia are parts of different plates. The plates floated toward each other across the ocean.
- (c) India and Asia are parts of different plates. The plates slowly moved toward each other over millions of years. When the plates hit each other, they broke into smaller pieces.
- (d) India and Asia are parts of different plates. The plates slowly moved toward each other as one plate went under the other plate into soft, solid rock over millions of years.



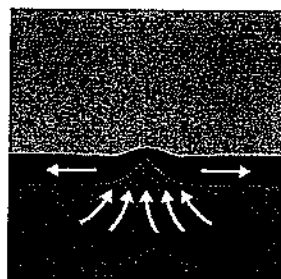
7. Which statement best describes Earth's outer layer underneath the surface in the image?

- (a) Underneath the soil, Earth's outer layer is made of hard, solid rock. Underneath the ocean, Earth's outer layer is made of sand.
- (b) Underneath both the soil and the ocean, Earth's outer layer is made of hard, solid rock.
- (c) Underneath the soil, Earth's outer layer is made of water.
- (d) Underneath both the soil and the ocean, Earth's outer layer is made of sand and water.



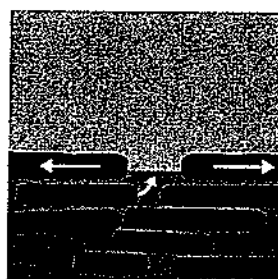
Sand and dirt filled in the gap that was created by the plates moving apart.

A



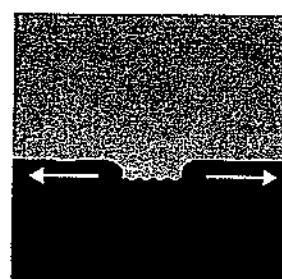
Soft, solid rock from underneath the plates rose and hardened, adding solid rock to the edges of both plates.

B



A new plate from underneath filled in the gap that was created by the plates moving apart.

C



Ocean water filled in the gap that was created by the plates moving apart.

D

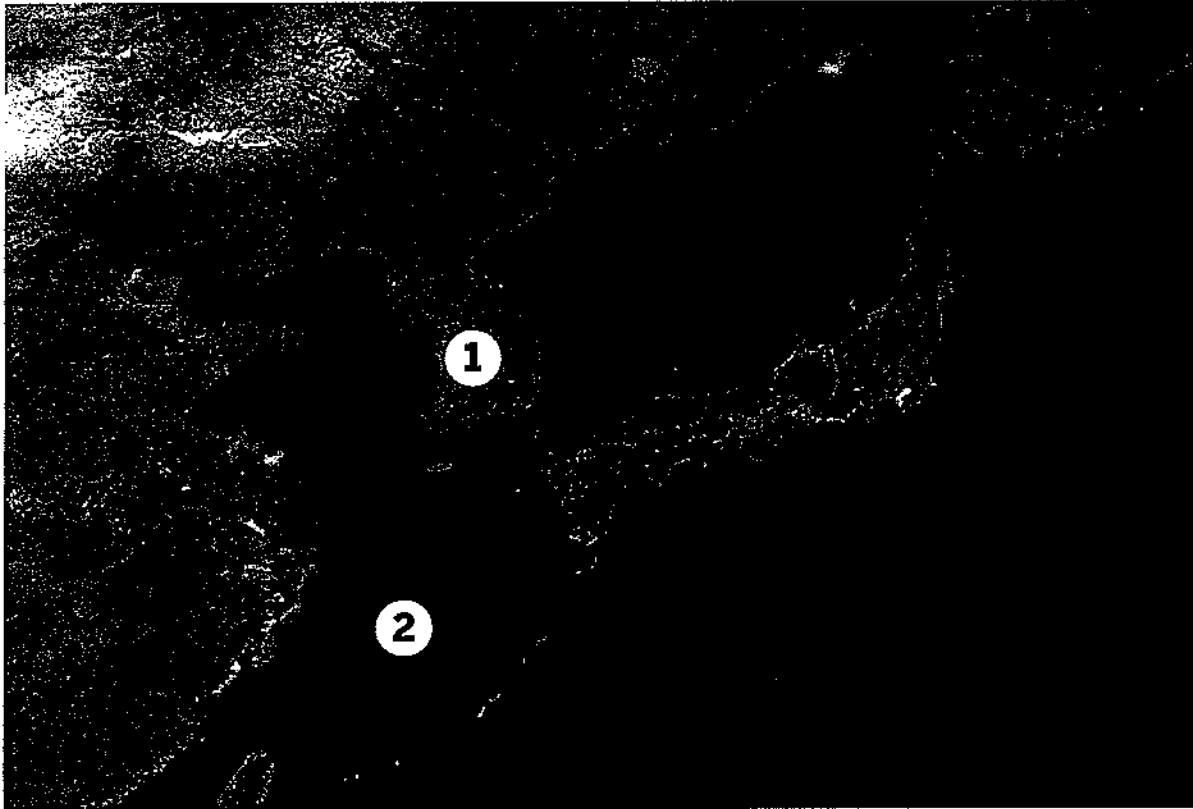
8. Dr. Mendoza and his team are studying two plates that are far apart from each other. However, these two plates used to be next to each other. *Which diagram shows what happened between these plates?*

- (a) **Diagram A:** Sand and dirt filled in the gap that was created by the plates moving apart.
- (b) **Diagram B:** Soft, solid rock from underneath the plates rose and hardened, adding solid rock to the edges of both plates.
- (c) **Diagram C:** A new plate from underneath filled in the gap that was created by the plates moving apart.
- (d) **Diagram D:** Ocean water filled in the gap that was created by the plates moving apart.



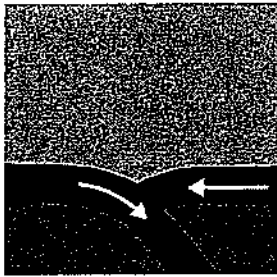
9. Similar rock formations have been discovered in the United States and Morocco. These rock formations were formed at the same time and are made of the same types of rocks. *What could explain how these rocks got so far apart?*

- (a) The United States and Morocco are parts of different plates. The plates were sometimes pushed far apart by earthquakes, and soft, solid rock from underneath got added to the edges of the plates.
- (b) The United States and Morocco are parts of different plates. The plates floated away from each other across the ocean.
- (c) The United States and Morocco are parts of different plates. The plates slowly moved far apart as soft, solid rock from underneath got added to the edges of the plates over millions of years.
- (d) The United States and Morocco are parts of different plates. The plates slowly moved apart as new plates from underneath got added between them over millions of years.

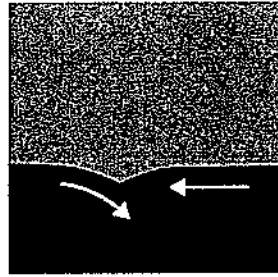


10. A team of engineers wants to study hard, solid rock under the surface of Earth. The team is considering drilling down in South Korea (1) and in the Yellow Sea (2). *Where will the team find hard, solid rock?*

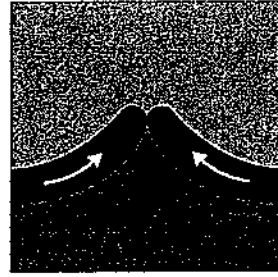
- (a) neither under 1 nor 2, because there is water under both places
- (b) neither under 1 nor 2, because there is sand and gravel under both places
- (c) under 1 and 2, because Earth's entire outer layer is made of hard, solid rock
- (d) only under 1, because Earth's outer layer is made of hard, solid rock under continents but not under the ocean



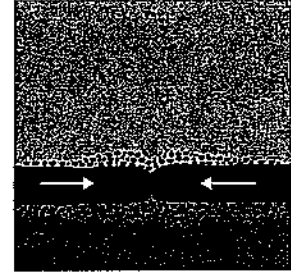
One plate is going underneath the other plate and sinking into the soft rock below.



One plate is going underneath the other plate and sinking into the ocean below.



Two plates are pushing against each other, causing the edges to bend upward.



Two plates are hitting each other, and the plates are breaking into pieces, creating sand.

A

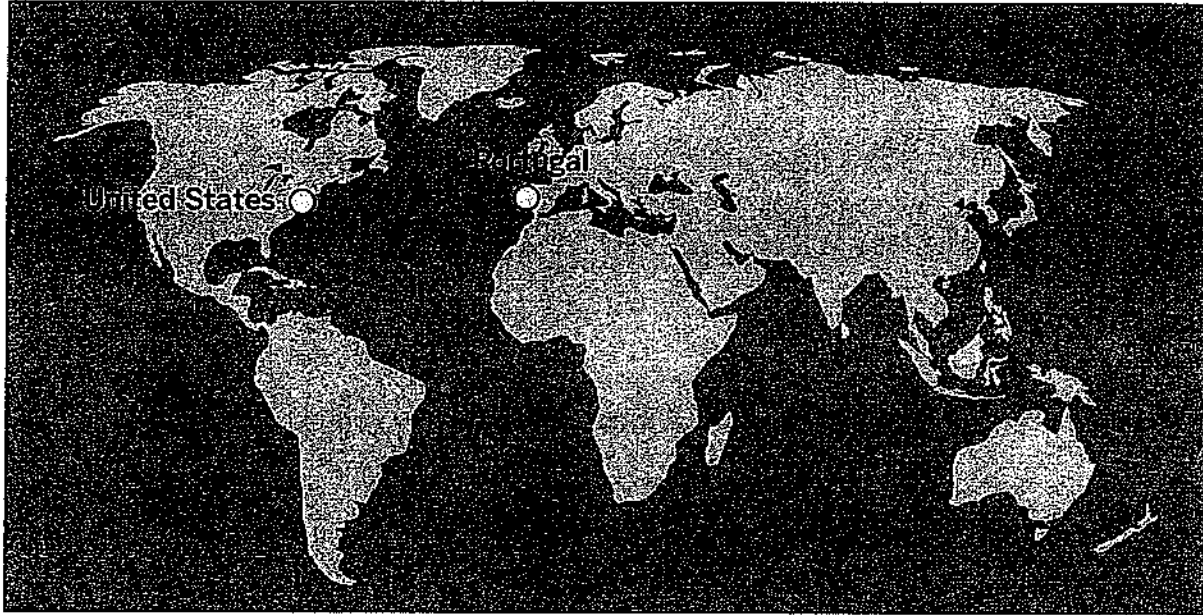
B

C

D

11. A team of geologists has been using GPS to track two plates that are moving toward each other. *Which diagram shows what is happening at the place where the plates are moving toward each other?*

- (a) **Diagram A:** One plate is going underneath the other plate and sinking into the soft rock below.
- (b) **Diagram B:** One plate is going underneath the other plate and sinking into the ocean below.
- (c) **Diagram C:** Two plates are pushing against each other, causing the edges to bend upward.
- (d) **Diagram D:** Two plates are hitting each other, and the plates are breaking into pieces, creating sand.



12. Similar rock formations have been discovered in the United States and Portugal. These rock formations were formed at the same time and are made of the same types of rocks. What could explain how these rocks got so far apart?

- (a) The United States and Portugal are parts of different plates. The plates were sometimes pushed far apart by earthquakes, and soft, solid rock from underneath got added to the edges of the plates.
- (b) The United States and Portugal are parts of different plates. The plates floated away from each other across the ocean.
- (c) The United States and Portugal are parts of different plates. The plates slowly moved apart as new plates from underneath got added between them over millions of years.
- (d) The United States and Portugal are parts of different plates. The plates slowly moved far apart as soft, solid rock from underneath got added to the edges of the plates over millions of years.

