Name: _____ Date: _____

Student Exploration: Building Pangaea

Vocabulary: continental drift, fossil, glacier, ice age, landmass, Pangaea, supercontinent

Prior Knowledge Questions (Do these BEFORE using the Gizmo.)

1. Antarctica is a frozen land, so cold and icy that no trees can grow there. Yet scientists have discovered **fossils** (remains preserved in rock) of ancient trees in Antarctica.

   What do you think this means? _____

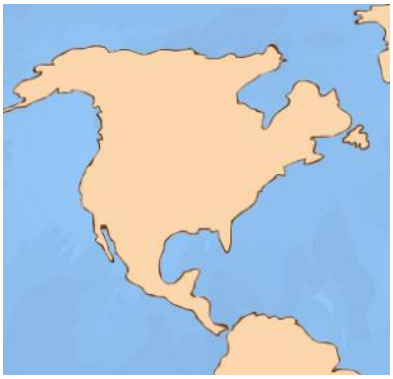
   _____

2. The Himalayas in central Asia are the tallest mountains in the world. But fossils of seashells can be found high in these mountains, far from any ocean.

   How do you think they got there? _____

   _____

Gizmo Warm-up

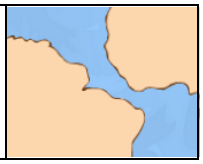


1. The Gizmo allows you to drag and rotate all the major **landmasses** on Earth.
   - To drag a landmass, grab it in the middle.
   - To rotate a landmass, grab it near the edge.
   - Learn the names by opening the **Tools** menu and dragging the **Help** icon over the landmasses.
   - Mark where you live. Open the **Tools** menu and drag an **arrow** to your location.
2. Test your geography skills. Drag and rotate landmasses randomly until you make a big mess. Then try to move them back to their original positions.

   When you have made the best map you can, open the **Tools** menu, select **Screen shot**, and copy the image into a blank document. Label the image “Map 1.”

3. Click **Reset**. Compare your map to the real one. How well did you do? _____

   _____

Activity A: **Solving the puzzle**	Get the Gizmo ready: • If necessary, click **Reset**. • Check that the **Evidence** shown is **None**.	

Introduction: In 1915, a German scientist named Alfred Wegener (VAY-guh-ner) proposed the theory of **continental drift**. According to this theory, the landmasses once were joined into a **supercontinent** called **Pangaea**. The landmasses then slowly drifted to their current positions.

Question: What did Pangaea look like?

1. Observe: Drag South America close to Africa. Look at their coastlines. What do you notice?

   _____

2. Explore: Try to fit all the landmasses together like a puzzle.
   - As much as possible, avoid overlapping landmasses.
   - When you are satisfied, take a screenshot and paste it into your document. Label this map "Map 2: Fit of the continents."

3. Analyze: Look at your map of Pangaea.
   A. How well do the continents fit together? _____
   B. Is it a perfect fit? Explain. _____
   C. Think about how the landmasses got from where they were to where they are today. Does it seem realistic that the landmasses could have moved like this? Explain.

   _____

   _____

4. Compare: If possible, present your map of Pangaea to your classmates and teacher. Look at other maps, and talk about each one.
   A. Are the maps very similar or very different? _____
   B. If Alfred Wegener showed you a map like this but did not have any other evidence, would you have believed his theory that the continents had moved? Explain.

   _____

   _____

   _____

Activity B: **Fossil and rock evidence**	Get the Gizmo ready: • Click **Reset**. • Under **Evidence** choose **Fossils**.	

Question: What do fossils and rocks tell us about Pangaea?

1. Observe: The brown areas in the Gizmo show where fossils of *Lystrosaurus* have been found. *Lystrosaurus* looked a bit like a dinosaur, but lived in a time before dinosaurs.

   A. On which landmasses did *Lystrosaurus* live? _____

   _____

   B. *Lystrosaurus* probably couldn't swim very far. How might the locations of *Lystrosaurus* fossils be seen as evidence that the continents were once together?

   _____

2. Explore: Use the fossil evidence to help you make a new map of Pangaea. When the map is done, paste a screenshot into your document. Label this map "Map 3: Fossil evidence."

   How well do the landmasses fit together this time? _____

3. Revise: Now under **Evidence** choose **Rocks**. The purple areas are mountains that formed when landmasses collided 450 million years ago. The orange areas show rocks that formed about 2 billion years ago.

   Adjust your map using this evidence, and then paste a screenshot of this map into your document. Label this map "Map 4: Rock evidence."

4. Compare: If possible, compare your map to those of your classmates.

   A. How similar are the maps? _____

   B. If Wegener showed you this evidence, would you have believed his theory? Explain.

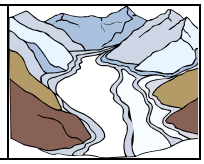
   _____

   _____

5. Extend your thinking: Click **Reset** and watch India closely. The Himalayan Mountains are found on the border of India and Eurasia. How do you think these mountains were formed?

   _____

   _____

Activity C: **Ancient ice sheets**	Get the Gizmo ready: • Click **Reset**. • Under **Evidence** choose **Glaciers**.	

Introduction: **Glaciers** are large, slow-moving sheets of ice. During **ice ages**, glaciers formed at the North and South Poles and spread out to cover large areas.

Question: What does evidence of glaciers tell us about Pangaea?

1. Observe: The white areas are places that show evidence of a massive ice sheet that existed around 250 million years ago.

   A. Which landmasses show evidence of ancient glaciers? _____

   _____

   B. Would you expect to find large glaciers on all of these landmasses today? Explain.

   _____

   _____

2. Explore: Drag the landmasses together to form a map of Pangaea. Try to line up the white areas on each continent. You can use the fossil and rock evidence as well if you like. Paste a screenshot of this map into your document, labeled "Map 5: Glacial evidence."

3. Analyze: Choose **Glaciers** (if necessary) and look at the white regions. Does this pattern make more sense now? Explain. _____

   _____

4. Extend your thinking: As glaciers moved away from the poles, rocks stuck to the bottom of the ice were dragged over the ground. This left scrapes and scratches on rock outcrops that can still be seen today. The scratches show which direction the glaciers moved.

   A. Look at the arrows that show the direction of glacial scratches. What is the pattern?

   _____

   B. Which landmass do you think was located over the South Pole in the time of Pangaea? Why? Discuss your answer with your teacher and classmates.

   _____

   _____