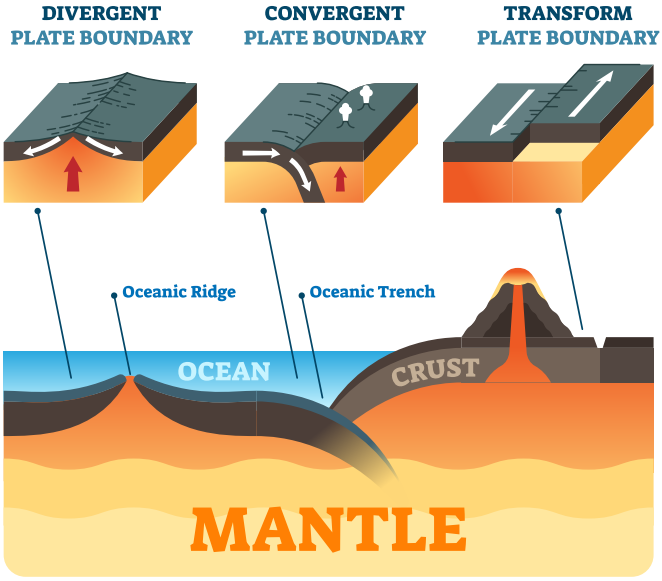
Evidence of Plate Tectonics

The **theory of plate tectonics** says that Earth's crust and the uppermost part of the mantle are broken up into pieces called **tectonic plates**. The breaks between plates are called **plate boundaries**. Plate boundaries are classified by the way the plates are moving relative to each other. The movement of plates is responsible for the formation of a number of different structures:



An **oceanic ridge** is formed at a **divergent boundary**, when two plates are moving away from each other. Magma rises to fill the gap created from the separating plates, which creates new crust.

An **oceanic trench** is formed at a **convergent boundary** between two plates, when one plate subducts (or dives) beneath the other. Unlike a divergent boundary where new crust is created, a convergent boundary is where old crust is destroyed as the plate subducts into the hot mantle. Often, volcanoes form on the other plate as a result of this subduction.

Transform boundaries are places where plates slide past each other. Crust is neither created nor destroyed at transform boundaries, but the movement of plates at these types of boundaries can cause earthquakes.

Answer the questions below to learn more about the evidence that supports the theory of plate tectonics.

1. Based on the theory of plate tectonics, would you expect to find very new rock or very old rock at an oceanic ridge? Explain why.

   (Sample answer) You would expect to find very new rock at an oceanic ridge because oceanic ridges form at divergent boundaries where one plate moves away from another and magma rises to create new crust.

2. Based on the theory of plate tectonics, would you expect to find very new rock or very old rock in an oceanic trench? Explain why.

   (Sample answer) You would expect to find very old rock in an oceanic trench because oceanic trenches form at convergent boundaries where one plate subducts beneath another and old crust is destroyed in the hot mantle.

3. In the Pacific Ocean, there is a plate boundary between two tectonic plates: the Pacific Plate, which contains some of the oldest oceanic crust on Earth, and the Mariana Plate. The Mariana Trench, the deepest oceanic trench on Earth, is located at this boundary. Nearby, there is an arc of volcanic islands called the Mariana Islands. Based on this information, what type of plate boundary is this? How do you know?

   (Sample answer) Based on this information, the plate boundary between the Pacific Plate and the Mariana Plate is a convergent boundary. Convergent boundaries form when one plate subducts beneath another, and they often create oceanic trenches at the boundary and a volcanic arc nearby.

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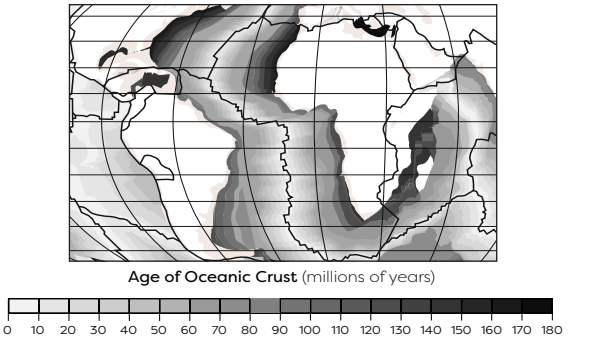
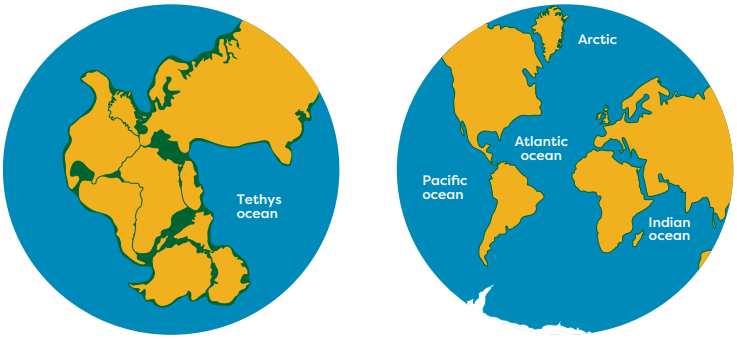
Keep going! Answer the questions below.

4. The image to the right is a digital model that shows the approximate age of oceanic crust around the world. Light grey represents the newest crust, and the black lines represent plate boundaries. Notice that the plate boundary in the middle of the Atlantic Ocean is surrounded by light gray shading. What type of plate boundary do you think this is? Explain why you think so.



(Sample answer) There is a divergent plate boundary at this location. Oceanic ridges often form at divergent plate boundaries, creating new crust. This would explain why the crust is newer the closer it is to the plate boundary.

5. Have you ever noticed that the shapes of the continents roughly fit together, like pieces in a jigsaw puzzle? Based on what you have learned about plate tectonics, explain how it's possible that the continental land masses were once joined together but are separate now.



(Sample answer) The theory of plate tectonics states that Earth is broken up into many pieces called tectonic plates and that these plates can move. It's possible that the continental land masses were once joined together but have since separated because of plate movement.

6. Mesosaurus fossils are found in South America and South Africa. Mesosaurus could swim but only in fresh water. Explain how this piece of evidence supports the theory of plate tectonics.

(Sample answer) This supports the theory of plate tectonics because the presence of Mesosaurus fossils in both South America and South Africa suggests that these continents were once joined together. Plate tectonics explains how these continents could have separated from each other over time.