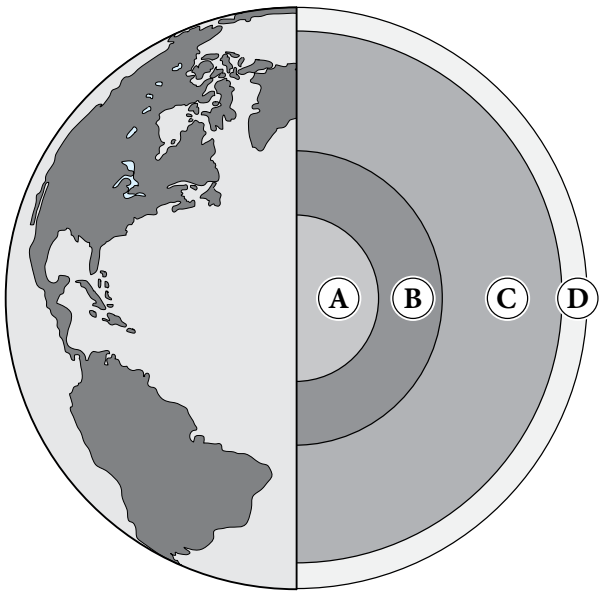
NAME: _____

DATE: _____

Excerpt from "Earth's Layers and Moving Plates"

Read the following excerpt and use it to label Earth's layers in the diagram that follows.

Earth's deepest layer is a solid inner core of very hot metal. This metal may be nearly as hot as the sun's surface. The outer core is also made of hot metal, but it's liquid, not solid. The mantle surrounds the outer core. The mantle is Earth's largest and thickest layer and consists of very hot, very dense rock. The rock is solid in the lower and upper parts of the mantle. In between, however, is a region where the rock is neither liquid nor solid. The slow movement and behavior of this material, caused by heat and pressure, have an impact on Earth's surface. Above the mantle is Earth's outermost layer, the thin, rocky crust. There are two types of crust: oceanic crust and continental crust. Oceanic crust is covered by ocean water. Most of the continental crust is dry land, but some of the crust around the edges is covered by water. Oceanic crust is thinner but heavier than continental crust.



A.

B.

C.

D.

Read the following excerpt and use it to complete the activity that follows.

Moving Plates

Scientists are still learning about plate tectonics. The theory of plate tectonics states that Earth's crust, together with the solid top of the mantle, is broken up into sections. These huge, rocky slabs are called

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tectonic plates. Tectonic plates fit tightly together. They aren't fixed in place though; they can move. They move because of heat and pressure in the mantle. As the material in the mantle slowly moves, it **exerts** enormous pressure on the overlying plates. All that pressure forces the plates to move as well—very, very slowly.

Earth's tectonic plates have been slowly moving and interacting for billions of years. They interact mostly along their edges, or boundaries. Plate boundaries are where two or more tectonic plates meet.

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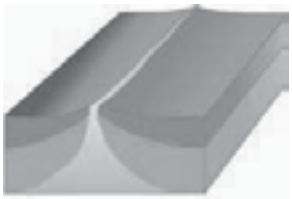
A Matter of Time


Tectonic plates move apart.

At some boundaries, tectonic plates are moving apart. As the plates separate, molten rock flows up from the mantle into the space between them, creating new crust. Mid-ocean ridges are an example of this type of plate interaction. Tectonic plates along the mid-ocean ridge in the Atlantic Ocean are moving apart at a rate of about 0.8 to 2 inches per year. That may not seem like much, but it adds up. Two hundred million years ago, the landmasses of North America and Europe were joined. So were South America and Africa. Thanks to separating plates, these continents now lie on opposite sides of a vast ocean.


Tectonic plates collide.

At other plate boundaries, tectonic plates are **colliding**, or crashing together. In some places, colliding plates slowly crash into each other. The crust at their edges gradually crumples and is pushed higher and higher, creating mountains. In other places, one of the colliding plates slides under the other. Two plates are colliding this way along the western coast of South America. A heavier oceanic plate is sliding under a lighter continental plate. Scientists call this process **subduction**. Subduction has created a deep ocean trench off the coast of Chile and Peru. It has also had a role in creating the towering Andes Mountains along the western edge of South America. Similar plate interactions have formed mountain ranges throughout Earth's long history.


Tectonic plates slide sideways past one another.

Finally, tectonic plates slide sideways past one another. It's never a smooth process. Plate edges press together hard. They often get stuck while the

pressure keeps building. Eventually the pressure gets too great. The stuck edges break free, causing the plates to jerk past each other.

Providing the Answers

The theory of plate tectonics answered many questions in geology. It explained how Wegener's Pangaea broke apart. It explained how the continents have been slowly rearranged over millions of years. The movement of the plates also explained mid-ocean ridges, deep ocean trenches, patterns in the locations of mountains, and many other features on Earth's surface. The theory has become the cornerstone of modern geology.

As plates move, interesting things happen. Most of the time, they happen incredibly slowly. Sometimes, though, the effects of plate movements are sudden and dramatic. Think earthquakes and volcanoes!

Core Conclusions

You may never have heard of the Danish scientist Inge Lehmann. Among seismologists, however, she is famous. Around 1900, scientists thought the earth had just three layers: an outer crust, a solid mantle, and a liquid core. Lehmann studied seismograph records of earthquakes. She analyzed how seismic waves changed as they traveled through Earth's interior. Lehmann collected thousands of records organized in boxes—there were no computers back then! She saw patterns in how seismic waves behaved as they moved through Earth. Lehmann concluded that Earth's core has two parts: a liquid outer core and a solid inner core. In 1936, she announced her findings and changed our view of Earth!

Use the correct word from the word bank to fill in each blank in the following paragraphs.

trench	theory	plate	subduction
continental	tectonic	collide	

Sam is excited to tell his family what he is reading and learning about geology at school. His cousins live in the South American country of Chile, and today he learned that there is a deep ocean _____ along Chile's coast. He explained, "There are two _____ plates that meet along the western coast of South America. One is a _____ plate and one is an oceanic plate. The heavier oceanic plate is sliding beneath the lighter continental _____. And, this process has a big name I learned today—it's called _____!"

"I think I know how the Andes Mountains of South America are formed," exclaimed Sam's dad. "When the plates _____ at plate boundaries along the Pacific Coast, I bet the continental crust crumples and gets pushed higher and higher to form the mountains. I learned about the _____ of plate tectonics when I was in school, too."

Sam's dad described an earthquake that the country of Chile had recently experienced. Sam said, "Hmmm . . . I wonder if earthquakes have anything to do with moving tectonic plates?"

What do you think?