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## Student Exploration: Plate Tectonics

**Vocabulary:** collisional boundary, convergent boundary, crust, divergent boundary, earthquake, lithosphere, mantle, plate, plate tectonics, subduction zone, transform boundary, volcano

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

**Volcanoes** are openings in Earth's **crust** where lava, gas, and ash can erupt. Where are active volcanoes located? Volcanos are usually near the ocean or land.

1. An **earthquake** is a violent shaking of Earth's surface. Where are earthquakes common? Along the plate crust and usually near the land of the crusts.

### Gizmo Warm-up

Volcanoes, earthquakes, mountains, and other features of Earth's surface owe their origin to the movements of **plates**: enormous, slowly-moving sections of Earth's crust. At plate boundaries, plates collide, move apart, move under or over each other, or slide past one another. The theory of **plate tectonics** describes how the plates move, interact, and change the physical landscape.



The *Plate Tectonics Gizmo*™ shows a cross-section, or side view, of Earth. (Not to scale.) Above the cross section is a bird's-eye view of the same location.

1. Turn on **Show labels**. What are the layers of Earth that you can see? I can see the crust, lithosphere, and mantle.
2. Turn on **Boundary name**, and click on each boundary. What four boundaries do you see? Transform Boundary, Convergent Boundary (Collision and Subduction), and Divergent Boundary

<p><b>Activity A:</b> <b>Sliding plates</b></p>	<p><u>Get the Gizmo ready:</u></p> <ul style="list-style-type: none"> <li>• Select BOUNDARY A.</li> </ul>	
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**Question:** What happens when plates slide past one another?

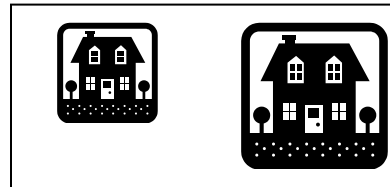
1. Observe: Boundary A is a **transform boundary**. The arrows below the BOUNDARY A label will move the plates. Click the left arrow once to see how the plates move.

How would you describe the motion of plates in a transform boundary? It moves farther away.

2. Sketch: Draw a bird's-eye view of the plate boundary before and after the plate motion. Draw an arrow to show which way the plate moved.



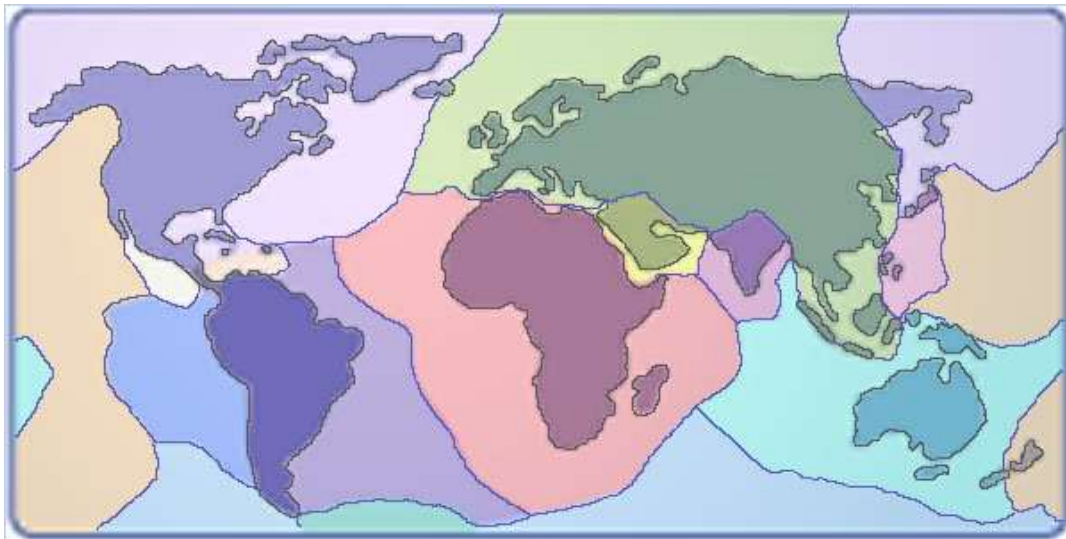
Before movement

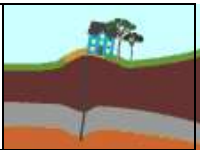


After movement

3. Locate: Turn on **Show location**. Where on Earth can you find this type of boundary? (Note: You can refer to a world map or atlas for location names.)  
Near the California coastline, above/below South America, above Africa, and on the sides of India

Highlight these locations on the map below.



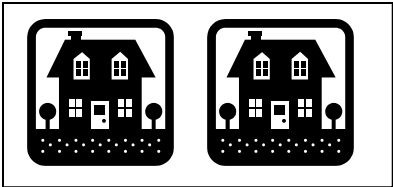
<p><b>Activity B:</b></p> <p><b>Colliding continents</b></p>	<p><u>Get the Gizmo ready:</u></p> <ul style="list-style-type: none"> <li>• Turn off <b>Boundary name</b> and <b>Show location</b>.</li> <li>• Select BOUNDARY B.</li> </ul>	
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**Question: What happens when two continents collide?**

1. Observe: Boundary B is an example of a **convergent boundary**, where two plates are moving toward one another. When the two plates both contain continental crust, it is called a **collisional boundary**. Click the left arrow four times to see how the plates move.

How would you describe the motion of plates in a collisional boundary? The plates are going towards each other.

2. Sketch: Draw a side view of the plate boundary before and after the plate motion. Draw an arrow to show which way the plate moved.



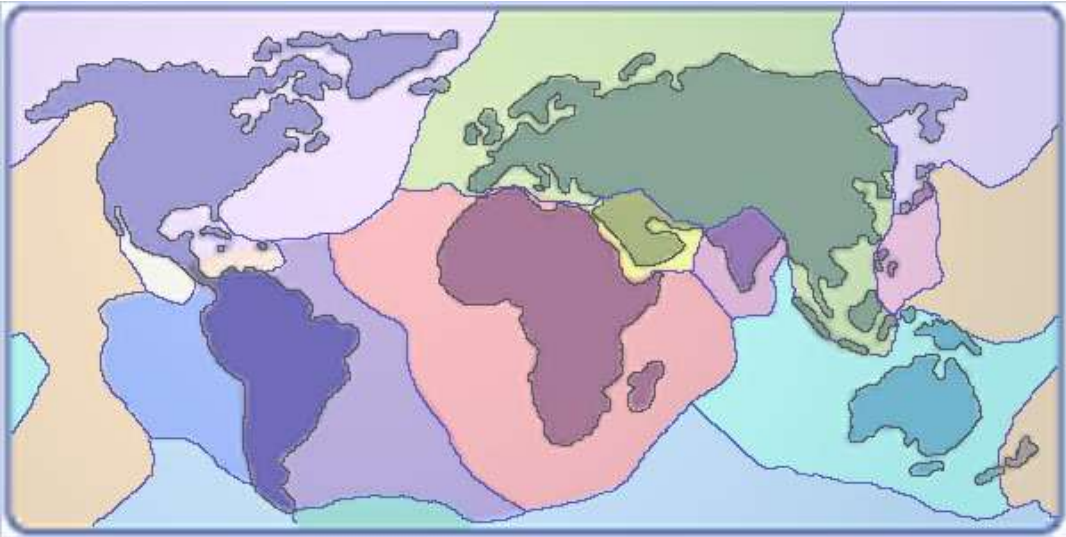
Before movement




After movement

3. Locate: Turn on **Show location**. Where on Earth can you find this type of boundary? (Note: You can refer to a world map or atlas for location names.)  
Above India, above the Middle East, and on the NW side of Eurasia

Highlight these locations on the map below.



<b>Activity C:</b> <b>Oceanic crust meets continental crust</b>	<u>Get the Gizmo ready:</u> <ul style="list-style-type: none"> <li>• Turn off <b>Boundary name</b> and <b>Show location</b>.</li> <li>• Select BOUNDARY C.</li> </ul>	
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**Question: What happens when ocean crust collides with continental crust?**

1. Observe: Boundary C is another type of convergent boundary called a **subduction zone**. Click the left arrow four times to see how the plates move.

How would you describe the motion of plates in a subduction zone? They are coming towards each other.

2. Sketch: Draw a side view of the plate boundary before and after the plate motion. Draw an arrow to show which way the plate moved.



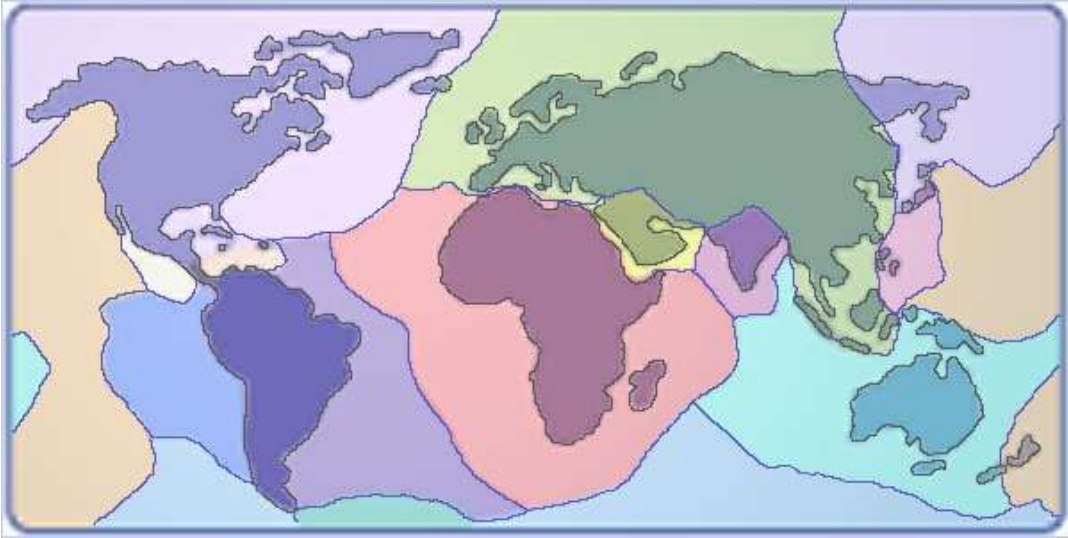
Before movement

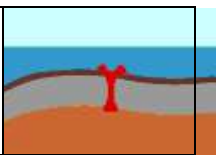


After movement

3. Locate: Turn on **Show location**. Where on Earth can you find this type of boundary? (Note: You can refer to a world map or atlas for location names.)  
Western side of South America, bottom of Alaska, All around the Filipino plate, South/SE/Eastern side of the Australian Plate, and Western side of the Pacific plate

Highlight these locations on the map below.



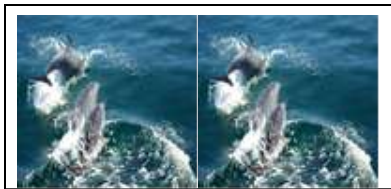
<b>Activity D:</b> <b>Spreading plates</b>	<u>Get the Gizmo ready:</u> <ul style="list-style-type: none"> <li>• Turn off <b>Boundary name</b> and <b>Show location</b>.</li> <li>• Select BOUNDARY D.</li> </ul>	
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**Question: How is new crust formed?**

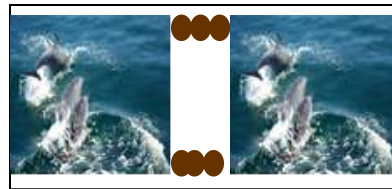
1. Observe: Boundary D is a **divergent boundary**. Click the right arrow four times to see how the plates move.

How would you describe the motion of plates in a divergent boundary? The plates are moving away from each other

2. Sketch: Draw a side view of the plate boundary before and after the plate motion. Draw an arrow to show which way the plate moved.



Before movement



After movement

3. Locate: Turn on **Show location**. Where on Earth can you find this type of boundary? (Note: You can refer to a world map or atlas for location names.)

The western side of the South American Plate, ¾ of the African Plate, Most of the Antarctic Plate, and Eastern side of the North American Plate/Eurasian Plate

Highlight these locations on the map below.

