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**Student Exploration:** **Plate Tectonics**

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

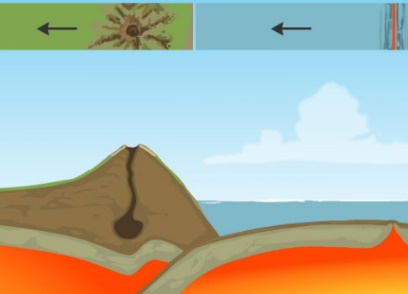
**Prior Knowledge Questions** (Do these BEFORE using the Gizmo.)

1. **Volcanoes** are openings in Earth’s **crust** where lava, gas, and ash can erupt. Where are active volcanoes located? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. An **earthquake** is a violent shaking of Earth’s surface. Where are earthquakes common? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**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? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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The **lithosphere** is a layer of rigid rock that consists of the crust and the upper part of Earth’s **mantle**. The **asthenosphere** is a layer of the mantle that can deform like plastic.

1. Turn on **Boundary name**, and click on each boundary. What four boundaries do you see? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_­­­­­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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| **Activity A:**  **Sliding plates** | Get the Gizmo ready:   * Select BOUNDARY A. | 2015-03-11_11-48-26 |

**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? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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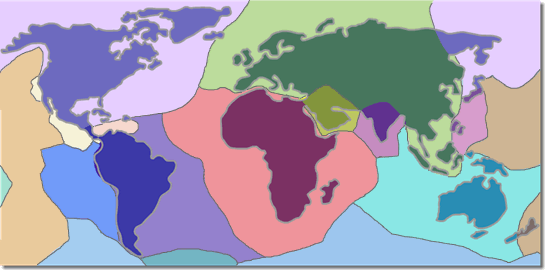
1. Sketch: Draw a bird’s-eye view of the plate boundary before and after the plate motion. Draw an arrow to show which way the plate moved.

Before movement After movement

1. Locate: Turn on **Show location**. Where on Earth can you find transform boundaries? (Note: You can refer to a world map or atlas for location names.)

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Highlight these locations on the map below.



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| **Activity B:**  **Colliding continents** | Get the Gizmo ready:   * Turn off **Boundary name** and **Show location**. * Select BOUNDARY B. | 2015-03-11_11-49-11 |

**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 converging plates both contain continental crust, it is called a **collision zone**. Click the left arrow four times to see how the plates move.

How would you describe the motion of plates in a collision zone? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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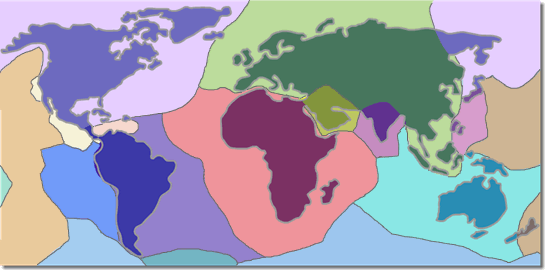
1. Sketch: Draw a side view of the plate boundary before and after the plate motion. Draw an arrow to show which way the plate moved.

Before movement After movement

1. Locate: Turn on **Show location**. Where on Earth can you find collision zones? (Note: You can refer to a world map or atlas for location names.)

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Highlight these locations on the map below.



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| **Activity C:**  **Oceanic crust meets continental crust** | Get the Gizmo ready:   * Turn off **Boundary name** and **Show location**. * Select BOUNDARY C. | 2015-03-11_11-49-48 |

**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? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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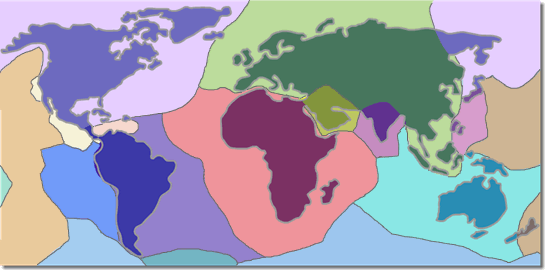
1. Sketch: Draw a side view of the plate boundary before and after the plate motion. Draw an arrow to show which way the plate moved.

Before movement After movement

1. Locate: Turn on **Show location**. Where on Earth can you find subduction zones? (Note: You can refer to a world map or atlas for location names.)

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| **Activity D:**  **Spreading plates** | Get the Gizmo ready:   * Turn off **Boundary name** and **Show location**. * Select BOUNDARY D. | 2015-03-11_11-50-50 |

**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? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. 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

1. Locate: Turn on **Show location**. Where on Earth can you find divergent boundaries? (Note: You can refer to a world map or atlas for location names.)

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Highlight these locations on the map below.

