# Pre-Lab Information

**Purpose** To observe how convection moves Earth’s plates and how plate boundaries are formed

**Time** Approximately two 45-minute periods

**Question** What effect does plate movement have on geologic events and structures on Earth's surface?

**Summary** In this lab, you will observe a model that shows how convection currents work. You will relate your observations to the processes that drive plate tectonics. You will also create a model for the different types of plate boundaries caused by the interaction of plates to understand how plate tectonics can change the shape of Earth’s surface.

# Lab Procedure

1. **Prepare for the project.** 
   1. Read through this guide before you begin, so you know the expectations for this lab.
   2. If anything is not clear to you, be sure to ask your teacher.
2. **Open the virtual lab.**
3. **Prepare the convection model.**
   1. Drag the beaker to the tank to fill the tank with cool water.
   2. Press the **“Continue”** button to proceed.
   3. Drag the pieces of paper to the surface of the water.
   4. Drop them onto the surface of the water.
   5. Proceed to the next part of this experiment.
4. **Observe the movement of the food coloring and paper**.
   1. Drag the food coloring to the center of the tank.
   2. Press the **“Continue”** button to proceed.
   3. Observe what happens to the food coloring and pieces of paper for 3 minutes. Use the top view and side view buttons to see different views of the tank. Note that the in-program timer will go faster than the actual time. Also, you will be able to reset the timer by pressing the **“Replay”** button to see the animation again.
      1. Every 30 seconds, record any changes in the behavior of the food coloring in Table A in the **Data** section of this guide. Use the side view to get a better view of the behavior of food coloring.
      2. Every 30 seconds, record any changes in the behavior of the pieces of paper in Table A in the Data section of this guide.
   4. Proceed to the next part of this experiment.
5. **Observe how convection moves pieces of paper.**
   1. Drag the cup of hot water and place it under the container, just below the food coloring.
   2. Press the **“Continue”** button to proceed.
   3. Watch what happens to the food coloring and the pieces of paper for 5 minutes. Use the top view and side view buttons to see different views of the tank. Note that the in-program timer will go faster than the actual time.
      1. Every 30 seconds, record any changes in the behavior of the food coloring in Table B in the Data section of this guide. Use the side view to get a better view of the behavior of the food coloring.
      2. Every 30 seconds, record any changes in the behavior of the pieces of paper in Table B in the Data section of this guide.
   4. Read the text about convection currents.
   5. Proceed to the next activity.
6. **Model how a divergent boundary occurs.** A divergent boundary is where two plates move apart from each other. Cracks in the crust occur, and rift valleys and mountain ridges may form at this type of boundary.
   1. Drag the left plate to the left and/or the right plate to the right.
   2. Observe what happens to the crust at the divergent boundary.
   3. Draw the model in Table C in the **Data** section of this guide. Label the plates and include arrows to show the direction of each plate’s movement.
   4. Read the text about divergent boundaries.
   5. Proceed to the next activity.
7. **Model how a convergent boundary occurs between two continental plates.** A convergent boundary is where two or more plates collide. Mountain chains may form when continental plates come together.
   1. Drag the left and/or right plate toward the other plate.
   2. Observe what happens to the crust at the convergent boundary.
   3. Draw the model in Table D in the **Data** section of this guide. Label the plates and include arrows to show the direction of each plate’s movement.
   4. Read the text about this type of convergent boundary.
   5. Proceed to the next activity.
8. **Model how a convergent boundary occurs between an oceanic plate and a continental plate.** A convergent boundary is where two plates collide. A convergent boundary between an oceanic plate and a continental plate has an ocean side and a land side. Volcanoes, mountains, and trenches are formed when a continental plate and an oceanic plate come together.
   1. Drag the left and/or right plate toward the other plate.
   2. Observe what happens to the crust at the convergent boundary.
   3. Draw the model in Table E in the **Data** section of this guide. Label the plates and include arrows to show the direction of each plate’s movement.
   4. Read the text about this type of convergent boundary.
   5. Proceed to the final activity in this lab.
9. **Model a transform boundary.** A transform boundary is where two plates slide past each other, moving in opposite directions. Earthquakes may occur at this boundary type.
   1. Drag the right plate up and the left plate down.
   2. Observe what happens to the crust at the transform boundary.
   3. Draw the model in Table F in the **Data** section of this guide. Label the plates and include arrows to show the direction of each plate’s movement.
   4. Read the text about transform boundaries.
   5. When you have completed the lab, move to the next activity in the Virtual Classroom.

# Data

Record your observations and data either in your lab notebook or in the tables below.

**Table A: Movement of Food Coloring and Pieces of Paper in Cool Water**

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| **Time**  **(minutes: seconds)** | **Food Coloring Movement** | **Paper Movement** |
| **0:30**  **(2:30 on timer)** |  |  |
| **1:00**  **(2:00 on timer)** |  |  |
| **1:30**  **(1:30 on timer)** |  |  |
| **2:00**  **(1:00 on timer)** |  |  |
| **2:30**  **(0:30 on timer)** |  |  |
| **3:00**  **(0:00 on timer)** |  |  |

**Table B: Movement of Food Coloring and Pieces of Paper in Heated Water**

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| --- | --- | --- |
| **Time**  **(minutes: seconds)** | **Food Coloring Movement** | **Paper Movement** |
| **0:30**  **(4:30 on timer)** |  |  |
| **1:00**  **(4:00 on timer)** |  |  |
| **1:30**  **(3:30 on timer)** |  |  |
| **2:00**  **(3:00 on timer)** |  |  |
| **2:30**  **(2:30 on timer)** |  |  |
| **3:00**  **(2:00 on timer)** |  |  |
| **3:30**  **(1:30 on timer)** |  |  |
| **4:00**  **(1:00 on timer)** |  |  |
| **4:30**  **(0:30 on timer)** |  |  |
| **5:00**  **(0:00 on timer)** |  |  |

**Table C: Drawing of Divergent Boundary Model**

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**Table D: Drawing of Convergent Boundary Model—Continental Crust vs. Continental Crust**

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**Table E: Drawing of Convergent Boundary Model—Oceanic Crust vs. Continental Crust**

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**Table F: Drawing of Transform Boundary Model**

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