

10

Plate Boundaries

COMPUTER SIMULATION

FROM GPS DATA, we know that Earth's lithospheric plates move very slowly—even the fastest plates move less than 10 cm per year. But they have also been moving for millions of years. Over long periods of time, the plates can move great distances and cause many changes to Earth's surface. At plate boundaries, Earth's plates can spread apart, move towards each other, move past each other, or some combination of these. In this activity, you will investigate what happens to Earth's surface at different types of plate boundaries.

GUIDING QUESTION

What happens where Earth's plates meet?



The Red Sea was formed by spreading between the African and Arabian plates.

MATERIALS

For each student

- 1 Student Sheet 10.1, "Spreading Plate Observations"
- 1 Student Sheet 10.2, "Other Plate Movement"

PROCEDURE

Part A: Spreading Plates

Visit the *SEPUP Third Edition Geological Processes* page of the SEPUP website at www.sepuplhs.org/middle/third-edition, and go to the Plate Motion Simulation.

1. Set the direction for Plate 1 to move by clicking on the arrow pointing left (←).
2. On Student Sheet 10.1, "Spreading Plate Observations," record the directions in which Plate 1 and Plate 2 will move.
3. Click on the SEE PLATES OVER TIME button at the bottom of the screen. You should now see a legend on the bottom left of the screen. Read the legend so you know what each symbol means.
4. Write the scientific term for this plate boundary type, seen in the upper left corner, on your Student Sheet.
5. Use the PICK TIME button to set the simulation to run for 10 years.
6. Click on the RUN button to begin the simulation, and carefully observe what happens.
7. Record your observations on Student Sheet 10.1.
8. Reset the screen by clicking on the RESET TIME button.
9. Repeat Steps 4–8, but run your simulation for 100 years.
10. Repeat Steps 4–8, but run your simulation for 1,000 years.
11. Repeat Steps 4–8, but run your simulation for 1 million years.
12. Repeat Steps 4–8, but run your simulation for 5 million years.
13. Repeat Steps 4–8, but run your simulation for 20 million years.

Part B: Other Types of Plate Motion

14. Reset the simulation by clicking the HOME button.
15. Choose a different direction for Plate 1 to move.
Hint: do not click on the arrow pointing left (←) again or you will repeat your observation of a spreading plate boundary).
16. On Student Sheet 10.2, “Other Plate Movement,” circle the directions in which Plate 1 and Plate 2 will move, and record the scientific term for the boundary type that you are investigating on your Student Sheet.
17. Click on the SEE PLATES OVER TIME button. If you are investigating a plate boundary where plates collide, record the type of lithosphere (continental or oceanic) on the same line of Student Sheet 10.1 as the type of boundary.
18. Use the PICK TIME button to set the simulation to run for 20 million years.
19. Click on the RUN button, and observe what happens. Repeat the simulation with different combinations of lithosphere, or run it for different periods of time so you can make better observations.
20. Record your observations on Student Sheet 10.1.
21. If you selected a plate boundary where plates collide, click on the button labeled WHAT IF TWO OCEANIC PLATES COLLIDE? and repeat Steps 16–18. If you did not select a convergent boundary, go on to the next step.
22. Reset the simulation by clicking the HOME button.
23. Repeat Steps 14–21, but select a new direction for Plate 1 to move.

ANALYSIS

1. In the simulation, how many years passed before major changes to Earth’s surface were noticeable?
2. Why do the geological processes that occur at convergent boundaries vary?

ACTIVITY 10 PLATE BOUNDARIES

3. In your science notebook, make a table like the one below. Identify the scientific term for each type of plate boundary, and then place an “X” to identify what is likely to happen at each type of plate boundary. Describe the patterns you observed in the data.

Comparing Plate Motion

		<i>What might happen at this type of boundary?</i>			
<i>Types of plate motion</i>	<i>Scientific term for boundary type</i>	<i>Earthquakes</i>	<i>Volcanoes</i>	<i>Mountain forming</i>	<i>Trench</i>
<i>Moving towards each other</i>					
<i>Spreading apart</i>					
<i>Moving past one another</i>					

4. Do you think Earth’s continents and oceans will look the same in the future as they do now? Why or why not? Use evidence from the activity to support your ideas.
5. **Reflection:** Earth’s plates are constantly moving, yet Earth’s surface looks relatively the same each day. Why don’t we observe changes to Earth’s surface every day?