Table Tectonics

Overview:

During this lesson, students will learn that new material is created at ocean floor spreading centers by simulating a spreading center using rolls of paper and tables. They will understand that material close to the spreading center is newer than material far from the spreading center.

Objectives:

The student will:

- simulate ocean floor spreading by pulling strips of paper, at timed intervals, from between two tables; and
- identify that rock near a spreading center is newer than rock far from a spreading center.

Materials:

- Receipt tape (2 long strips per group)
- Tables (2 per group)
- Markers
- Digital kitchen timer
- Student Worksheet: "Spreading Centers"

Answers to Student Worksheet:

1. b) rock closest to the spreading center
2. a) rock farthest from the spreading center
3. See diagram at right.
4. Rock Layer C is youngest because it is closest to the spreading center.
5. Rock Layer A is oldest because it is farthest from the spreading center.
6. Answers will vary but should indicate an understanding that as new crust is formed at spreading centers, old crust is pushed into ocean trenches where it melts to become magma, then returns to Earth's mantle.

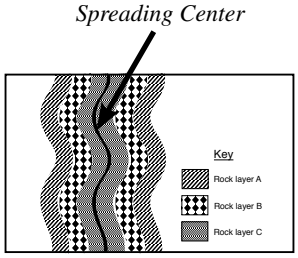


Table Tectonics

Activity Procedure:

1. Explain that students will model ocean floor spreading by pulling strips of paper up at timed intervals from between two tables. This model demonstrates the relative ages of rocks near ocean floor spreading centers. Oceanic crust is always the youngest crust on Earth because it is being recycled. Currently, there is no oceanic crust older than 200 million years, whereas continental crust is about 4 billion years old.
2. Divide students into groups of four and ask each group to push two tables or desks together. Give each group two strips of receipt tape paper (each at least 6 ft. long), and a package of markers.
3. Demonstrate how to push one end of each strip of paper up between the tables. Explain the four jobs associated with the model. Assign the following positions in each group:

   Crust Movers—Two students are needed to represent the force of Earth. Each student will hold one end of one strip of paper as it is fed up through the crack between tables. When the teacher gives the direction, each will slowly pull the strip of paper out from between the tables until the teacher tells them to stop. It is important that both students pull their paper at the same rate so that approximately the same amount of paper is coming out on both sides of the spreading center.

   Grapher—One student will use markers to color the strips of paper as the Crust Movers are pulling. Each time the teacher tells students to stop pulling, the Grapher should change marker colors.

   Recorder—One student will be the Recorder. Each time the teacher stops the Crust Movers and calls out the time, the Recorder will write the time on both strips of paper, at the point where the papers are coming out from between the tables.
4. Ask students to arrange themselves around their tables. The Crust Movers should sit opposite each other and the Recorder and Grapher should sit where they can easily reach the point where the two strips of paper come up between the tables.
5. Set a kitchen timer for 2 minutes. Start the timer and ask Crust Movers to begin pulling slowly. After 10 seconds, say, "Stop" and report the time (1:50). Stop the timer. Allow Recorders to write the time and Graphers to finish coloring. Repeat the process, allowing 5-15 second intervals. After two minutes, groups will have long strips of multicolored paper pulled up from between the tables. Do not let students pull the paper out from between the tables completely.

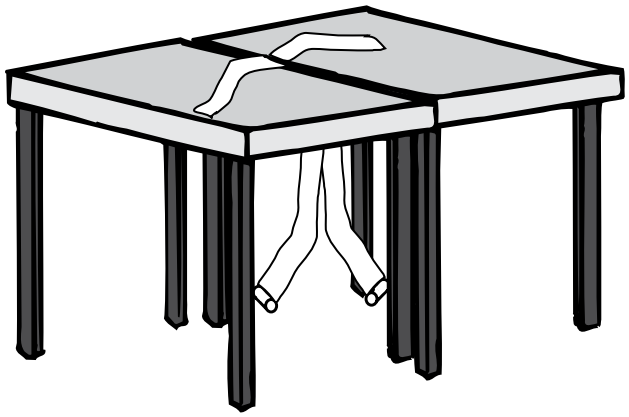


Table Tectonics

6. Distribute and ask students to complete the Student Worksheet: "Spreading Centers."
7. Explain that the crack between the tables represents an ocean floor spreading center and the colored strips on the paper represent different ages of rock. Ask students which rock is the youngest (rock closest to the spreading center). Ask which rock is the oldest (rock farthest from the spreading center). Explain that although students completed the demonstration in just a few minutes, it would take the ocean floor many years to move such a great distance.

Note: Paleomagnetism is the study of Earth's magnetic field as preserved in the alignment of magnetic particles within rocks. These particles align to Earth's magnetic field when the rocks are formed. Earth's magnetic field reverses polarity at irregular intervals but on average every 500,000 years. The relative ages of rocks on the ocean floor can be found by measuring the magnetic polarity of the rocks and comparing those measurements to the established magnetic polarity time scale. The magnetic polarity of rocks near ocean floor spreading centers indicate younger paleomagnetic birth dates than the magnetic polarity of rocks far from ocean floor spreading centers.

Name:_____ **Student Worksheet**

Spreading Centers

Directions: Answer each of the questions below. Continue on the back of this page if needed.

1. The youngest rock at an ocean floor spreading center is:
   a) rock farthest from the spreading center
   b) rock closest to the spreading center
   c) all rock is the same age

2. The oldest rock at the ocean floor spreading center is:
   a) rock farthest from the spreading center
   b) rock closest to the spreading center
   c) all rock is the same age

3. Label the spreading center on the diagram shown below.

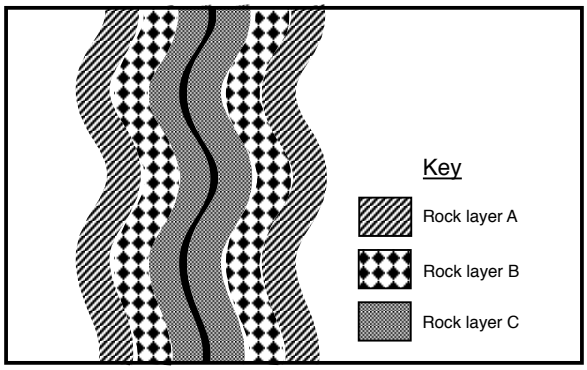
4. Which layer represents the youngest rock? Explain how you know.

   _____

   _____

   _____

   _____



5. Which layer represents the oldest rock? Explain how you know.

   _____

   _____

6. Since new land is being formed at spreading centers, why isn't Earth getting larger?

   _____

   _____

   _____

   _____

