

## Seafloor Spreading

*(Earth Science Indicator #9 – Describe the interior and structure of Earth and Earth’s crust as divided into tectonic plates riding on top of slow moving currents of magma in the mantle)*

*(Earth Science Indicator #11 – Use models to analyze the size and shape of Earth, its surface and its interior[e.g., globes, topographic maps, satellite images])*

*(Earth Science Indicator #12 – Explain that some processes involved in the rock cycle are directly related to the thermal energy and forces in the mantle that drive plate motions)*

### Background:

About 40 years ago, scientists discovered that there are both age and magnetic patterns in the seafloor. This discovery allowed another piece of the puzzle about plate tectonics to fall into place.

What scientists found was that new seafloor has continually been forming over millions of years at the mid-ocean ridges that wind throughout all Earth’s oceans. Molten rock, called **magma**, from inside Earth rises to the seafloor and as it rises it cools and solidifies into new rock. In some places on the seafloor, this new rock is pulled apart by the plates’ movements, forming two rock masses that move away from each other in opposite directions. Here, the seafloor spreads very slowly away from the ridge.

Geologists call this process **seafloor spreading**.

Elsewhere, trenches are formed where one plate slides beneath another. Because the older seafloor rock eventually descends into trenches and is removed, the oldest seafloor rocks are only about 180 million years old. The oldest continental rocks, which don’t descend into trenches, are as old as 4,000 million years.

In this Activity, you will construct a paper model to investigate the patterns that scientists have discovered in their studies of the seafloor.

### Objective:

To construct a paper model that will illustrate how the seafloor spreads (is created) at mid-ocean ridges and is consumed (removed) where it descends into trenches.

### Materials:

Each group will need

- One copy of the seafloor spreading model pattern
- Scissors
- Crayons or colored pencils (orange, yellow, green, blue)
- Tape

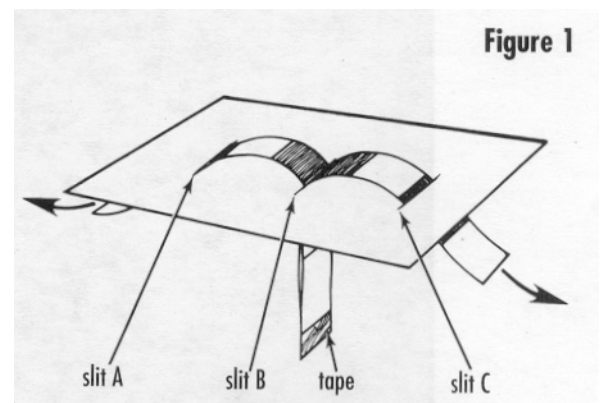
### Vocabulary:

**Magma:** Molten rock, before it reaches Earth’s surface.

**Seafloor spreading:** The process by which molten rock rises, cools, solidifies, and is pulled apart by tectonic plates.

### Procedure:

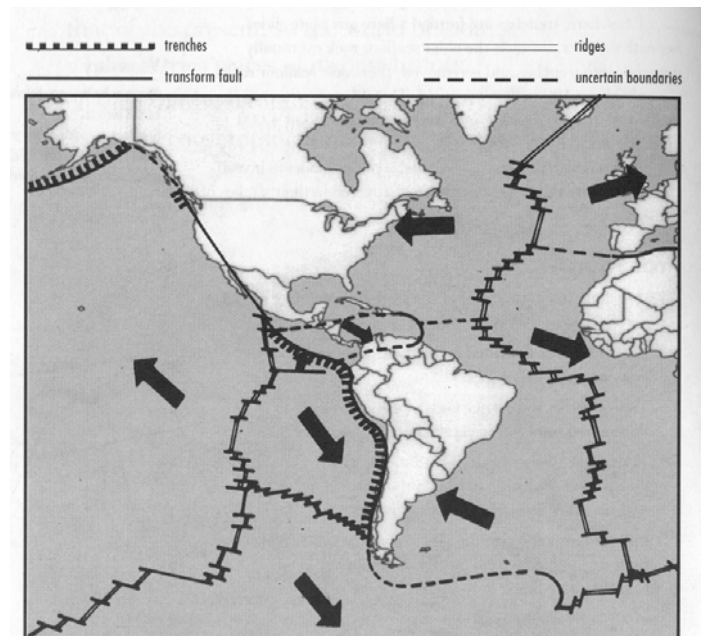
1. Cut along the dotted lines of the seafloor-spreading model pattern on p. 96.
2. Color the areas indicated on the two strips with crayons or colored pencils.
3. Tape together the orange ends of the strips with the colored sides facing each other.
4. Thread the two strips through Slit B of the larger sheet. Pull one side down through Slit A and the other through Slit C (Figure 1).
5. Pull the strips through the slits so that the same colors on both strips emerge from Slit B and disappear into Slits A and C at the same time.



**Conclusions:** (answer the following questions using complete sentences)

1. What is happening at Slit B? What feature occurs at the corresponding location on the seafloor?
2. What is happening at Slits A and C? What features occur at corresponding locations on the seafloor?
3. If you were to sample and date the rocks along the colored strip starting at Slit B and moving toward Slit A, what change if any would you see in the age of the rocks?
4. If you were to sample and date the rocks along the colored strip starting at Slit B and moving toward Slit C, what change if any would you see in the age of the rocks?
5. In this model, what do the strips represent? What do the colors represent?
6. New seafloor rock is continually being formed at mid-ocean ridges and old seafloor rock is continually removed at ocean trenches. If the rock on the continents is continually formed but not removed, how would the age of the oldest rocks on the continents compare with the age of the oldest rocks on the seafloor?
7. What are the strengths and weaknesses of this model as a model for demonstrating seafloor spreading?
8. What causes the plates to be pulled apart?

9. Look at the map on the right showing some of Earth's plates and the direction of their motion. What is happening to the Atlantic and Pacific Oceans? Explain your answers.



slit A

slit B

slit C

