

Modeling Plate Movement

This activity challenges students to develop a working model of plate divergence at the mid-ocean ridge and plate convergence at a trench. To do this, students must understand and apply the concepts they have learned about how new rock is created through sea-floor spreading at the mid-ocean ridge and how old rock sinks back down into Earth's interior at a trench.

◆ Expected Outcome

Students' models should use the paper strips and shoe box to represent magma welling upward at a mid-ocean ridge, the plate on each side of the mid-ocean ridge moving toward a trench, and the old rock of each plate sinking downward at each trench. Students should draw and label on their model the mid-ocean ridge, plates, and trenches. They should also indicate that the plates are moving away from the mid-ocean ridge and sinking back into Earth's interior at the trenches. An excellent model will label diverging and converging plates.

◆ Content Assessed

This activity assesses students' understanding of the processes of sea-floor spreading, plate divergence, and plate convergence that shape the ocean floor.

◆ Skills Assessed

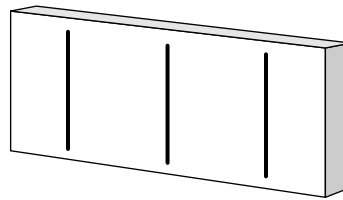
building models, applying concepts

◆ Materials

- ◆ Each student will need a shoe box lid or bottom that will model a section of the seafloor crust and mantle.
- ◆ Each student will need two 35-cm-long strips of adding-machine tape or other paper cut approximately 35 cm x 10 cm.
- ◆ Provide a variety of colored marking pens for students to use.

◆ Advanced Preparation

- ◆ Prepare the shoe box lids and bottoms by cutting three parallel slits, each about 12-cm long, as shown below. The middle slit will model a mid-ocean ridge. The other two slits will model ocean trenches.



- ◆ Cut 35-cm-long strips of adding-machine tape or cut strips of other paper approximately 35 cm x 10 cm. For example, you can cut sheets of legal-sized paper in half lengthwise.

◆ Time

30 minutes

◆ Monitoring the Task

- ◆ Before distributing the student worksheet and materials, ask students to review to themselves what happens at mid-ocean ridges and deep ocean trenches.
- ◆ Hand out the worksheets and materials and make sure students understand the instructions.
- ◆ As students draw their sketch, encourage them to consider how they can use the materials to model the process of sea-floor spreading.
- ◆ Circulate through the classroom and review students' sketches. If any students are not showing sea-floor spreading correctly, use prompt questions to get them on track. For example, ask: **Which way do plates move at a mid-ocean ridge?** (*They move away from each other.*) **What happens to the plates at a trench?** (*One plate sinks under the other and back into Earth's interior.*)
- ◆ As students finish their model, you may wish to have them use the model to demonstrate sea-floor spreading for you.



Modeling Sea-Floor Spreading

In assessing students' performance, use the following rubric.

| | 4 | 3 | 2 | 1 |
|--|---|--|--|---|
| Planning and Constructing the Model | The sketch is complete and accurate, and the model clearly demonstrates sea-floor spreading, with mid-ocean ridge, plates, trenches, and other features creatively illustrated and correctly labeled. | The sketch is mostly complete and/or accurate and the model demonstrates adequately sea-floor spreading, with mid-ocean ridge, plates, and trenches illustrated and correctly labeled. | The sketch is mostly complete but is inaccurate and the model has a major flaw that prevents it from clearly demonstrating sea-floor spreading. Features are illustrated, but not correctly labeled. | The sketch is mostly incomplete and/or inaccurate and the model fails to demonstrate sea-floor spreading. Most features are missing. |
| Concept Understanding | The student demonstrates a mastery of the concepts that underlie the model, including sea-floor spreading and diverging and converging plates. | The student demonstrates an adequate understanding of the concepts that underlie the model, including sea-floor spreading and diverging and converging plates. | The student demonstrates only a partial understanding of the concepts that underlie the model, including sea-floor spreading and diverging and converging plates. | The student demonstrates little or no understanding of the concepts that underlie the model, including sea-floor spreading and diverging and converging plates. |



PERFORMANCE ASSESSMENT

Modeling Sea-Floor Spreading

◆ Problem

How can you model sea-floor spreading, using the materials provided?

◆ Materials

shoe box lid or bottom
paper strips
colored marking pens

◆ Devise a Plan

1. On a separate sheet of paper, draw a sketch of the process of sea-floor spreading. Show what happens at a mid-ocean ridge and at an ocean trench. What happens to the plates of Earth's crust at each of these places?
2. Consider your drawing and the materials you've been given. How can you use these materials to model sea-floor spreading?
3. Use the materials to construct a model of sea-floor spreading. Draw and label a mid-ocean ridge, two plates, and two trenches. Show how the plates are moving. Add any other labels you wish.

◆ Analyze and Conclude

Answer the following questions on another sheet of paper.

1. What does the center slit in the shoe box represent? What do the side slits represent?
2. What do the strips of paper represent?
3. What kind of plate boundaries are demonstrated in your model?
4. Describe what happens at a mid-ocean ridge.
5. What happens at an ocean trench?

