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Lab: Sea-Floor Spreading

**Objective:** To understand captured magnetism directions on the sea floor of the Atlantic Ocean and how that provides evidence for the plate tectonics theory.

**Materials Needed:**

* 2 different colored markers
* 2 pieces of paper (11x17 or 8.5x14)
* Tape
* 2 desks
* Work in groups of 2-3

**Procedure:**

1. Push 2 desks so their edges are almost touching.
2. Tape the 2 pieces of paper together at one of their shorter ends.
3. 2 of the three students:
   1. Place the paper with the taped edge down into the slight gap between the desks as far down as possible while still having a grip on the papers.
   2. Practice pulling both papers out of the desk at the same time and at the same rate of movement. Each of the 2 students should pull their paper along their desk and towards themselves.
4. Once practice is completed, the 3rd student should hold the first colored marker.
5. The 2 students holding the 2 papers, should start with a little bit of paper showing.
6. Following the teacher’s directions, and as you both **very slowly** pull the paper out at the same rate, have one student color both pieces of paper along the gap with one marker, so that each paper has a strip of color parallel to the gap in the desk.
7. When the teacher **announces that the magnetic pole has shifted to the opposite direction**, the 3rd student will change to the 2nd marker color and make a 2nd strip of color on both papers along the gap.
8. Continue to change the marker color each time the teacher states the magnetic pole has reversed again.
9. When the last edges of the papers come out of the gap, tape those edges together (the “newest” rocks on each paper taped together.)

**Evaluation & Questions:**

1. Label the following on the taped paper model:
   1. The Mid-Ocean ridge
   2. Write on “N” for “North” pointing on the strips of color that represent NORMAL polarity. **This should be the last color made, near the ridge**.
   3. Write an S for “South” on the opposite colored strips that represent REVERSED polarity.
   4. The youngest rocks
   5. The oldest rocks
2. Put your name on the back of the paper model.
3. Convection in the mantle is thought to cause tectonic plate movement. Convection cycles have been discussed in the atmosphere, in the ocean and now in the mantle. Convection consists of cycling rising and sinking. Describe what causes the air, water, or magma in a convection cycle to:
   1. Rise?
   2. Sink?
4. As magma comes up through the mid-ocean ridge,
   1. Do the plates converge or diverge?
   2. How did you determine your answer for part a?   
      (Hint: think about how the pieces of paper are moving relative to one another)
5. On an real Isochron Map, the alternating strips of normal and reversed polarity are not all of equal width. What does this tell you about the lengths of time of normal and revered polarity throughout geologic history?
6. Imagine that your hands as you pulled the paper out from the desk represent two continents that were once together but must move away from each other as the sea floor grows. In class, we discussed why scientists and society didn’t accept the idea of Continental Drift when Alfred Wegener first proposed the hypothesis.
   1. What was the problem with the idea of how the continents moved when Continental Drift was first proposed?
   2. How does this model and the theory of sea-floor spreading provide evidence for Plate Tectonics and how the continents could move?
7. According to theory, the Earth is about 4.6 billion years old. Yet, the oldest ocean floor is only about 200 million years old? What do you think happens to the older ocean floor? Explain.
8. To complete **AFTER** taking notes in class:   
     
   Write a **PARAGRAPH,** describing in detail what this activity is representing. Use your textbook or notes if needed for additional information, but be sure to USE YOUR OWN WORDS. Hint: You might include what each of the following represents: Paper coming up through the desks, the 2 different colored bands, the taped center, difference between rock in the center vs. at the edge, what the symmetry or mirror image on both sides of the tape represents.