Sea Floor Spreading

By: Nancy Volk

Plate Tectonics and the Sea Floor

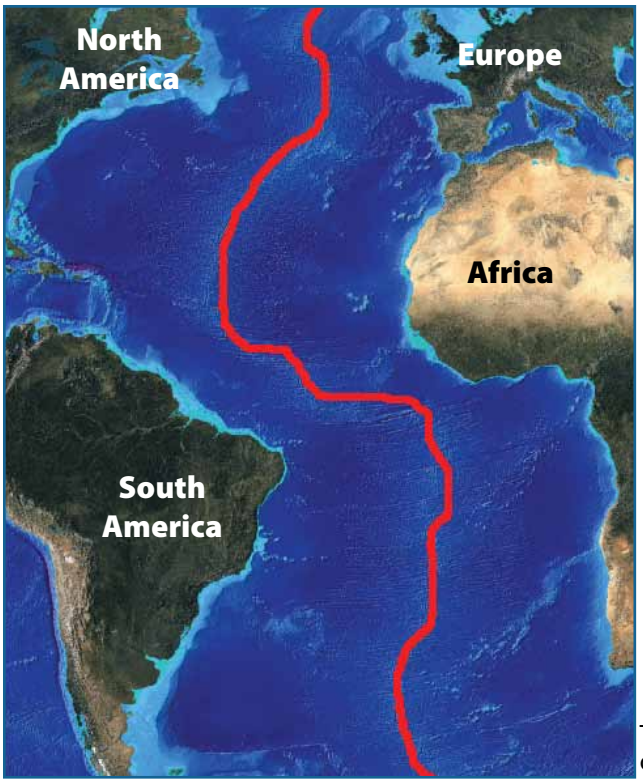
You should be familiar with the idea that the world is broken into plates. The plates move around and collide or spread apart creating new ocean crust or consuming crust, and creating earthquakes and volcanic activity.

The mid–Atlantic Ocean has an area where two plates **diverge** creating the **mid-Atlantic Ridge**. This ridge has been moving apart for over 200 million years.

At the mid-Atlantic ridge interesting things occur. At over 40,000 km long, it is the longest mountain range in the world. Some of the earth's youngest rocks occur along the ridge area. There are interesting **magnetic anomalies** that exist, providing more evidence that at one time the continents were pieced together.

In this lesson you will investigate the magnetic anomalies. These are parallel bands of rocks, on each side of the mid-Atlantic ridge that mirror each other. The fascinating thing about the rocks are that the magnetic alignments change and reverse **polarity** at times. The theory of why this occurs states that when the rocks are being formed from lava at the mid-Atlantic ridge, they harden and cool, taking on the magnetic polarity of the earth at the time or solidification. The bands of rock parallel to the mid-ocean ridge change in magnetic polarity as one moves towards the continents. Does this mean that Earth's magnetic poles have switched?

Try the activity and explore the reasons why the youngest rocks are located at the ridge and how the sea floor records a history of the magnetism of Earth. We will observe evidence of how the sea floor has spread apart over time. We call this **sea floor spreading**.



The red line traces the path of the mid-Atlantic Ridge.

MoST*

VOCABULARY

Diverge
Magnetic anomalies
Mid-Atlantic Ridge
Polarity
Sea floor spreading

HELPFUL TERMS

Divergence zones
Lithosphere
Magnetic North Pole
Magnetic reversals
Trench

Inside This Packet

New York State Standards

Middle School Activity

Middle School Activity

Standard 1:
Analysis, Inquiry, and Design
Math: m1.1b
Scientific: s1.1a, s1.2a, s1.2c, s1.4
Skills: Observing, describing

Standard 4: Physical setting
Key Idea 2: 2.1d, 2.2a, 2.2b, 2,2e, 2.2f

General Skills:
Use a magnetic compass
Interpret field maps

Activity: Sea Floor Spreading

MATERIALS NEEDED

Compass

2 sheets of paper

Pencils

2 bar magnets

Ruler

Tape

Students should be able to:

Identify where the mid-Atlantic ridge is located on a globe

Explain what causes the sea-floor to spread

Explain the magnetic anomalies

Determine where the youngest rock is located

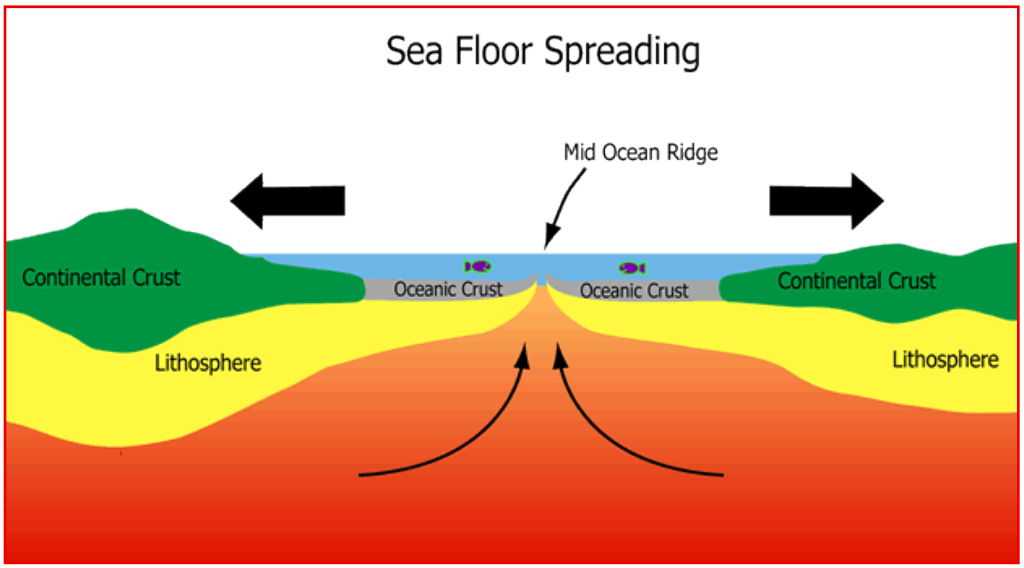
What to do:

1. Put two desks together. Take two pieces of paper and insert them up through the space between the desks. The longest side of the paper should come up through the slot. This will represent the mid-Atlantic ridge area.
2. Pull the papers apart so that several inches appear on each desk. Designate one end of the paper as top and the other as bottom, write this on the papers.
3. Place a bar magnet on each side of the top of the paper. Place a compass below the magnet and copy the direction of the north arrow onto the paper.
4. With a ruler and pencil, mark a long parallel line down the length of the paper to make the first band that represents the magnetic anomalies.
5. Next pull another inch to two of paper up through the slot. Switch the bar magnets so that the South pole faces the top of the paper. Place the compass below this and copy the direction of the arrow onto the paper. It should now be reversed from the first arrow.
6. Draw a parallel line close to the crack in the two desks creating the second parallel band. Continue this process until there is no more room left on the paper. There should be space for four bands.
7. Each paper should be a mirror image of the other side. Tape the two pages together in the middle representing the mid-Atlantic ridge.

Activity: Sea Floor Spreading

The youngest rock will always be closest to the ridge area and the oldest will be on the outside closest to the continents. The older rock is close to 400 million years old while the rock near the mid-Atlantic ridge is being created new constantly.

Students can add to this activity by tracing the outline of Africa and North and South America to the outside edge of the sea-floor papers. Doing this helps visualize the continents moving apart as the sea floor spreads.



Questions:

What do we think causes the sea-floor to spread?

_____

_____

What does this tell us about our continents? About the Ocean?

_____

_____

What other things have you learned about the movement of Earth's crust?

_____

_____

The following link shows images of the sea floor spreading as well as support materials for plate tectonics study.
http://www.windows2universe.org/earth/interior/seafloor_spreading.html&edu=elem&frp=/windows3.html