NAME: _____ PERIOD: _____ DATE: _____

LAB PARTNERS: _____ LAB #19

THE SPREADING SEAFLOOR

INTRODUCTION

When molten volcanic rock cools and solidifies, the magnetic minerals in them are magnetized in the direction of the Earth's magnetic field. They retain that magnetism, thus serving as permanent magnetic memories of the direction of the Earth's magnetic field in the place and the time they solidified.

It has been discovered that the Earth's magnetic field has two states: it can point either toward the North Pole, as it is today, or toward the South Pole during period of reversal of magnetic polarity.

A research vessel made crossings of the Mid-Atlantic Ridge, sampling rocks to determine their ages, and measuring the direction of magnetic field produced by rock on the ocean floor. In this investigation, you will be using data to study the rate of seafloor spreading occurring at the ridge.

OBJECTIVES

At the conclusion of this investigation you will be able to:

1. Determine the age of the rock on the seafloor given its distance from the center of the ridge.
2. Explain how the age of the seafloor varies as distance from the center of the ridge increases.
3. Calculate the rate at which the Mid-Atlantic ride is spreading apart.

MATERIALS

Calculator
Pencil with eraser

APPROXIMATE TIME

1 – 2 periods

PROCEDURE

1. Figure 1 shows the stations (A – F) that a research vessel stopped to take samples of oceanic crust. Using the map scale, record in the data table the distances (km) of stations A – F FROM THE CENTER OF THE RIDGE. Hint: Using a straight edge will help you determine the distance.

2. Using Figure 2, calculate and record the ages of the rocks at stations A – F.
   For example, at a distance of 20 kilometers, the rock would be approximately 1.6 million years old

3. Calculate the rate of movement in KILOMETERS PER YEAR. This will involve some conversions as outlined below.

   Example:
   If the distance from the center of the ridge s 25 km…
   Using figure 2, gives us an age of 2 million years
   The rate of movement in km/yr would be determined by dividing the distance by the age

   25 / 2,000,000 = .0000125 km/yr

4. After you have calculated the rates for all six locations (A – F), calculate the average rate of movement by adding the six values and dividing by 6.

5. Answer the lab summary questions.

Station	**A**	**B**	**C**	**D**	**E**	**F**
Distance from Ridge (km)						
Age (Millions of years)						
Rate of Movement (km/yr)						
Average Movement (km/yr)						

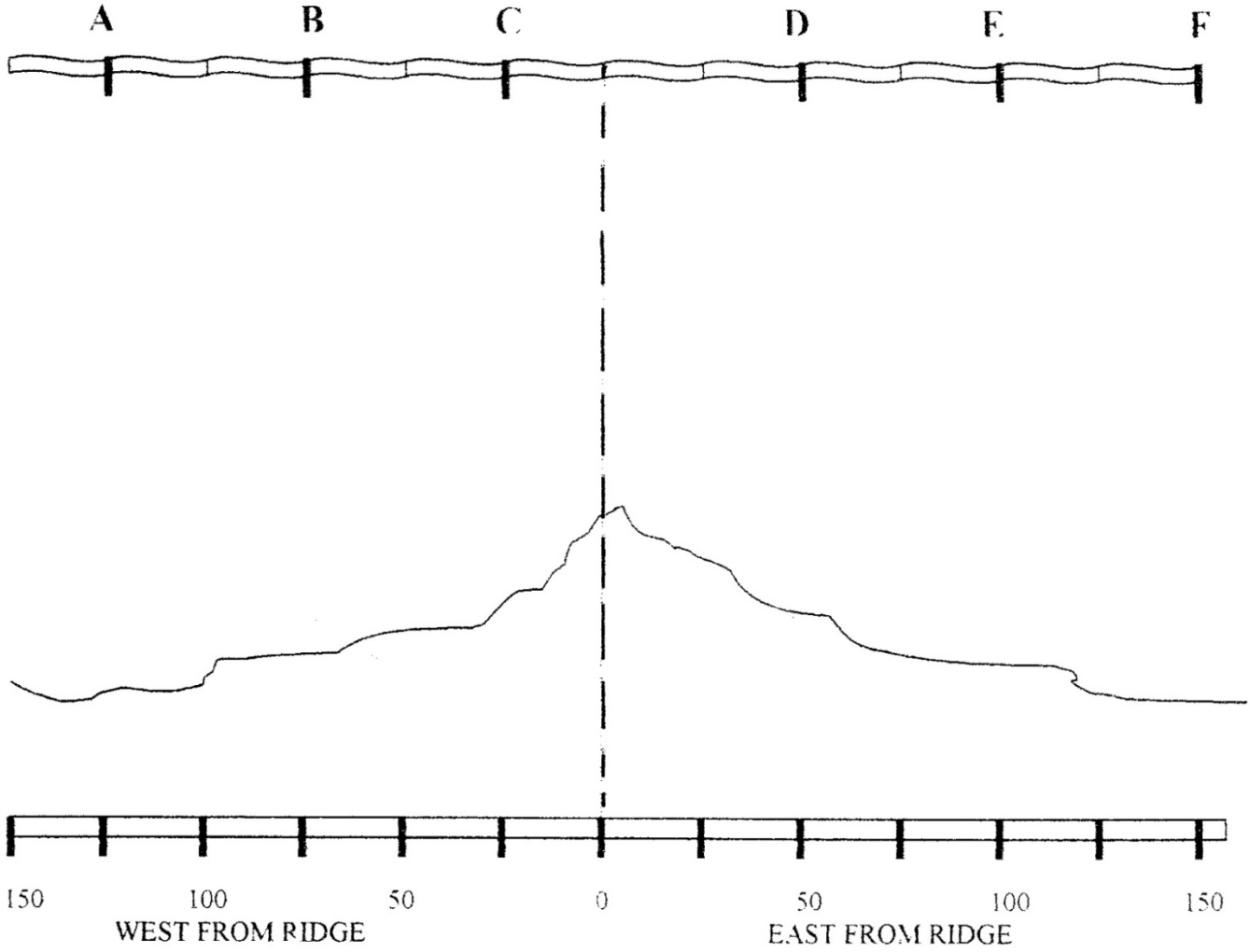
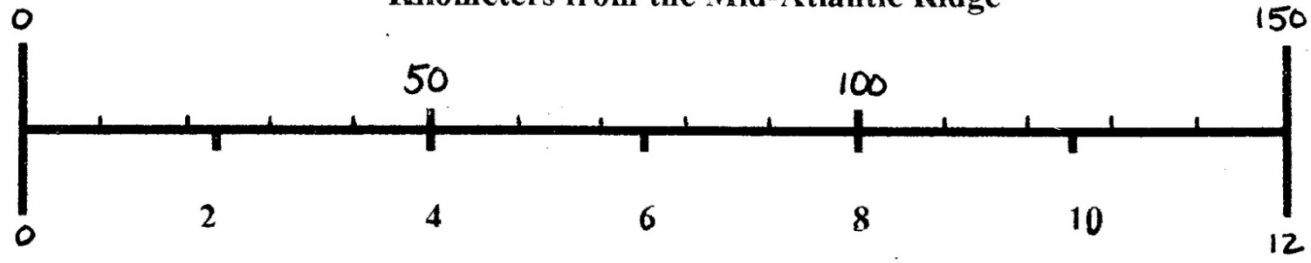


FIGURE 1: SCALE OF KILOMETERS

Figure 2: Rock Age Determination Scale
Kilometers from the Mid-Atlantic Ridge



Age of Rock in Millions of Years

LABORATORY QUESTIONS

1. Describe the age of the rocks found near the center of the oceanic ridge compared to those found farther away from the center.

2. Explain why the rocks are not all the same age on the ocean bottom.

3. Is crust created or destroyed at the oceanic ridge?

4. If the Earth's size remains constant and crust is created at ridges, what happens to the Earth's crust at the ocean trenches?

5. Would the rocks in the middle of the Mid-Atlantic ride today show normal or reverse polarity?

6. If the rocks 100 kilometers west of the Mid-Atlantic ridge show reversal on polarity, what type of polarity would they show of the east side of the ridge?

7. If the distance from both South America and Africa, to the center of the Mid-Atlantic ridge, is 2400 kilometers, using the average rate of movement calculated in this exercise, determine how long ago South America and Africa were joined together. SHOW ALL WORK!

PART 2

THE SPREADING SEAFLOOR

PROCEDURE:

1. On the grid below, design a graph to show the distance from the ridge vs. the age of the seafloor. (**Remember:** follow all rules for constructing graphs)

2. Answer questions 8 and 9 using complete sentences.

8. Based on your graph, describe the relationship between the distance from the ridge and the age of the seafloor.

9. What **kind** of relationship is this?