Name _____ Date _____ Period _____ 64

SEA FLOOR SPREADING

Directions – complete the following activities to learn more about Harry Hess' discovery of sea floor spreading.

Activity I - Who is Harry Hess?

Read the following passage and answer the questions that follow

The idea of continental drift circulated in scientific circles until World War II, when sounding gear, called SONAR, produced new evidence of what the seafloor looked like. The gear(SONAR), developed in the 1930s, bounced sound waves off the seafloor to determine its depth and features.

It happened that the command of one attack transport ship, the USS *Cape Johnson*, was given to Harry Hammond Hess, a geologist from Princeton University. Hess, then in his late thirties, wanted to continue his scientific investigations even while at war. So he left his ship's sounding gear on all of the time, not just when approaching port or navigating a difficult landing.

What Hess discovered was a big surprise. The bottom of the sea was not smooth as expected, but full of canyons, trenches, and volcanic sea mountains. Ocean floor exploration continued, and by the 1950s other researchers had found that a huge rift ran along the top of the Mid-Atlantic Ridge. That enabled Hess to understand his ocean floor profiles in the Pacific. He realized that the Earth's crust had been moving away on each side of oceanic ridges, down the Atlantic and Pacific oceans, that were long and volcanically active. He published his theory in *History of Ocean Basins* (1962), and it came to be called "seafloor spreading."
passage from https://www.khanacademy.org/partner-content/big-history-project/solar-system-and-earth/knowing-solar-system-earth/a/alfred-wegener-and-harry-hess

1. How was SONAR used to map the ocean floor?

2. Who is Harry Hess?

3. How did Hess and others expect the ocean floor to look like?

4. What are the features that were found on the ocean floor?

5. What motion of the Earth's crust did Hess realize was happening at the Mid-Atlantic Ridge? What did he call this motion?

Activity 2 - Sea Floor Spreading

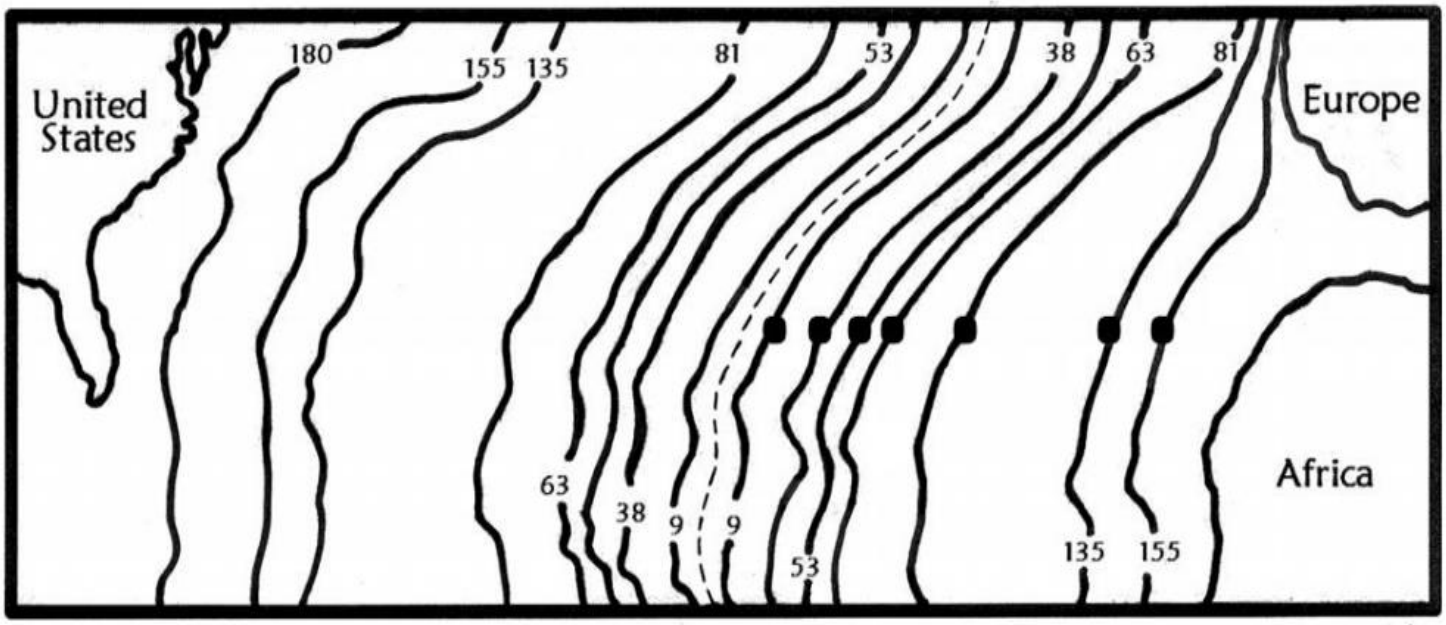
Focus Question: How does the age of the ocean floor provide evidence for seafloor spreading?

Scientists have been able to establish the ages of areas of rocks on the ocean bottom. The pattern in the ages of the rocks across the ocean floor is used as evidence of sea-floor spreading. The diagram on the next page represents the ocean floor in the North Atlantic Ocean. The numbers on the map give the age (in millions of years) of the rocks on the ocean floor located along the lines.

Step 1: Find the United States, Africa, and Europe on the map. Shade them with a green colored pencil. Then, look for the dashed line (- - - -) in the middle of the map. This line represents the Mid-Atlantic Ridge. Trace it in blue

Step 2: Lightly shade in the age bands as listed below. (**Some colors will have more than one age band in them**)

Mid-Atlantic Ridge - **white**	9-38 million years - **yellow**	38-63 million years - **red**
63-81 million years - **purple**	81-135 million years - **brown**	135-180 million years - **orange**



Step 3: Use a ruler to measure the distance in centimeters (to the nearest tenth) from the Mid-Atlantic Ridge to each of the positions shown by a dot (measure to the middle of the dot). Write the measurements on the data chart in Column B.

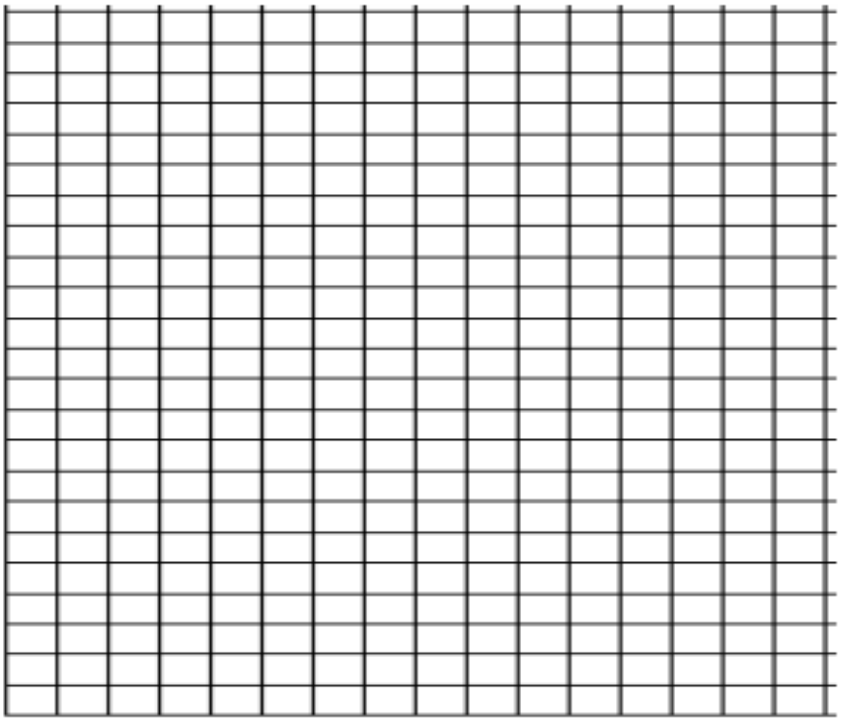
Step 4: Complete the rest of the data chart by calculating the actual distance in kilometers. On the map, 1 centimeter equals 700 kilometers. So, to find the actual distance, multiply the centimeters from Column B by 700.

Column A	Column B		Column C
Age of Sea Floor (millions of years)	Distance from Mid-Atlantic Ridge to Dot (cm)	Multiply Column B by 700 to find column C	Actual Distance
9			
38			
53			
63			
81			
135			
155			

Step 5: Graph the data in the chart to show the relationship between age (millions of years) and distance (km). You will be using the data in Column A and Column C.

• Label the X axis "Age (millions of years)". (Each line represents 10 years.) • Label the Y axis "Distance (km)". (Each line represents 250 km.) • Plot the data points and connect to make a line graph.
• Title your graph.

Title:



Analysis Questions

1. This graph represents the relationship between _____ and _____ from the Mid- Atlantic Ridge.

2. What does this information tell us about the age of rock as it gets further away from the mid-ocean ridge?

3. What do you notice about the banding on both sides of the Mid-Atlantic Ridge? How does this provide evidence for seafloor spreading? Explain in complete sentences and use evidence to support your answer.