Name ________________________________ Class ________

Plate Tectonics Activity # 1

Grade 8 – Science

Introduction:

You have learned about Continental Drift, the three types of boundaries (divergent, convergent, and transform), subduction, and the role of convection currents in the Earth's mantle. It seems the different parts of our planet are moving, and this movement has caused changes in the continents over time. This movement has also caused major geologic events like earthquakes and volcanoes. Are the Earth's plates still moving? Are the plates moving slowly or quickly?

Problem:

How fast is the sea floor spreading? Has the sea floor always moved at the same speed over time?

Background:

Scientists have been able to establish the ages of vast areas of rocks on the ocean bottom. The pattern in the ages of the rocks across the Mid-Atlantic ridge is used as evidence of sea-floor spreading. In this activity, you will observe the pattern and learn to calculate the rate of sea-floor spreading.

Procedure:

1. The diagram on the next page represents a section of the ocean floor in the North Atlantic. The numbers give the ages in **millions of years** for the rocks on the ocean floor located along the lines.

2. Locate the Mid-Atlantic ridge and **trace it in RED**.

3. **Lightly shade** in the age bands as follows:
   - 0 – 9 million years = white
   - 9 – 38 million years = purple
   - 38 – 63 million years = blue
   - 63 – 81 million years = yellow
   - 81 – 135 million years = green
   - 135 – 180 million years = orange

4. Draw a line on the map from A to B with a RULER. This line represents a path across the Atlantic Ocean from North America to Africa.

5. Use a ruler to measure the distance in centimeters (cm), to the nearest tenth (0.1), from the mid-ocean ridge to each of the positions shown by a dot. Record the measurements on the data table provided in the column titled "Distance from Mid-Atlantic ridge in cm" Column B.

6. Complete the rest of the data table by finding the actual distance in kilometers. **(1 cm = 500 km).**
   Use the formula below to do this:

Actual distance (km) = Column B (cm) x 500 km/cm

Assessment Questions:

Directions: Type the answers to the following questions. Be sure you use complete sentences and be sure you answer all parts of the question. **You must type the question and then answer it below.**

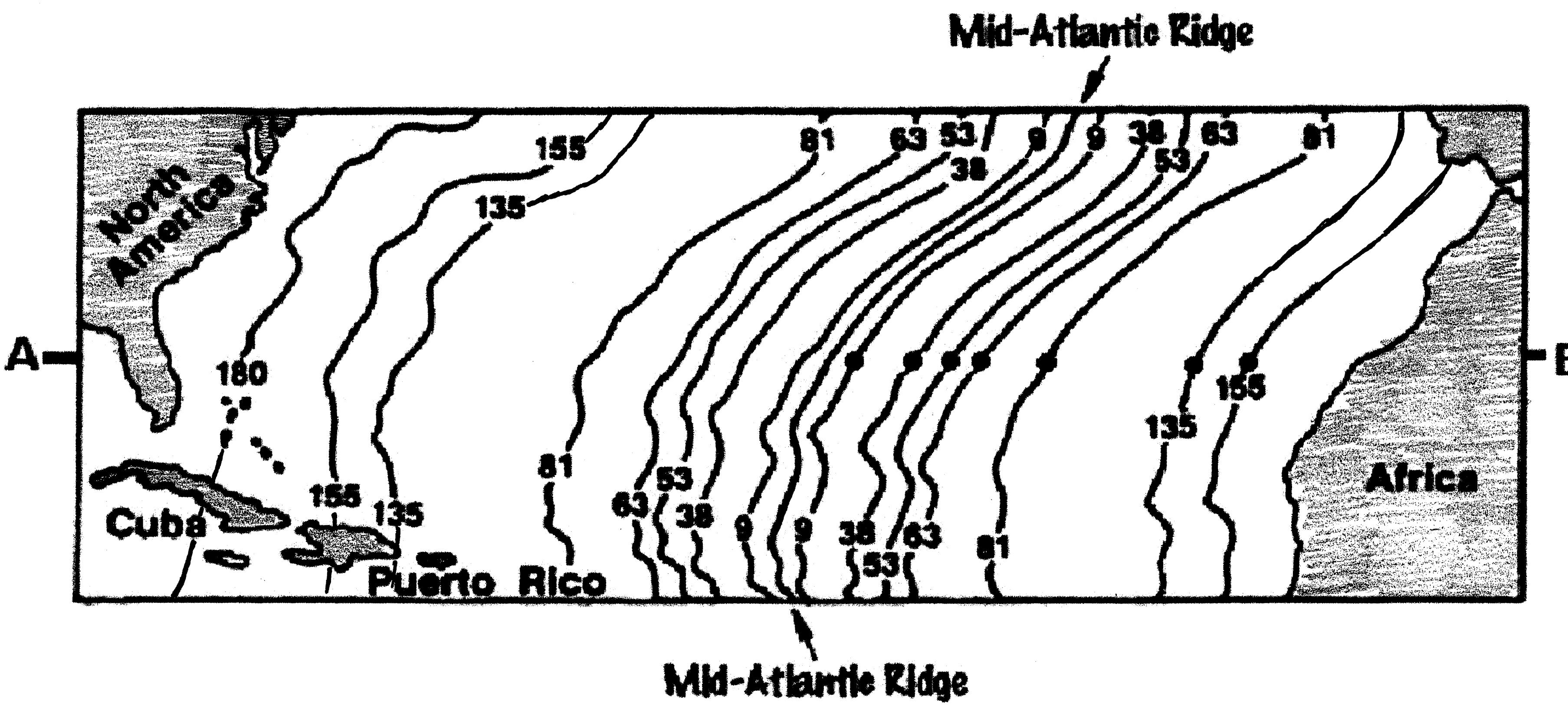
1. Based on your calculations and looking at the graph, has the rate (speed) of sea-floor spreading been the same over the past 135 million years? Use evidence to support and explain your answer.
2. Describe the pattern in the ages of the rocks on the sea floor, where are the oldest rocks found?
3. What part of the ocean floor has the youngest rocks?
4. Use the graph to predict the distance (km) for the Mid-Ocean Ridge where rocks 75 million years old would be.
5. Use the graph to predict the distance (km) for the Mid-Ocean Ridge where rocks 185 million years old would be.
6. Will you be able to see changes in the sea floor during your lifetime? Use evidence from the activity to support your answer.
7. The oldest rocks on Earth are located on the continents and are about 3.5 Billion years old (3,500 million). Explain why the oldest rocks of the ocean floor are only 180 million years old?

* **PRINT out a copy of your answers and then staple your lab together in the following order:**

Order to pass in lab:

1. Your data table
2. Your Graph
3. Assessment Sheet
4. Typed/Printed Assessment Questions

Staple all of the above together before you come to class.



Scale: 1cm = 500km

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Plate Tectonics Data Table:

Column A	Column B	Column C
Age of sea-floor in millions of years at dots.	Distance from Mid-Atlantic Ridge (cm) to dots	Actual Distance (km)
9		
38		
53		
63		
81		
135		
155		

Graph Directions:

Graph the data in the chart to show the **relationship** between ages (millions of years) to the distance (km). Use the data in the columns highlighted in grey.

- Label the x-axis with age (millions of years)
- Label the y-axis with distance (km)
- Plot the data points and label each with the date
- Connect the data points.
- Draw a line of best fit.

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Plate Tectonics Activity Students Assessment

Grade 8 - Science

1. Use the information from your data table and the formula below to determine the rate of sea floor spreading in the past **38 million years.**

Rate of movement (cm/yr) = distance moved (cm)
time (years)

a. Distance from table = ___________ km

b. Convert the distance in kilometers into centimeters by multiplying by 100,000. (100,000 cm = 1 km)

Distance = _________ cm

c. Use the equation above to calculate the rate. (NOTE – add 6 zeros to the number in the years column so that the calculation will produce the centimeters per year).

Show work below:

Rate = _________________________________ cm/yr

2. Use the information from your data table and the formula below to determine the rate of sea floor spreading in the past **<u>135 million years.</u>**

Rate of movement (cm/yr) $= \dfrac{\textbf{distance moved (cm)}}{\textbf{time (years)}}$

a. Distance from table = ___________ km

b. Convert the distance in kilometers into centimeters by multiplying by 100,000. (100,000 cm = 1 km)

Distance = _________ cm

c. Use the equation above to calculate the rate. (NOTE – add 6 zeros to the number in the years column so that the calculation will produce the centimeters per year).

Show work below:

Rate = ________________________________ cm/yr