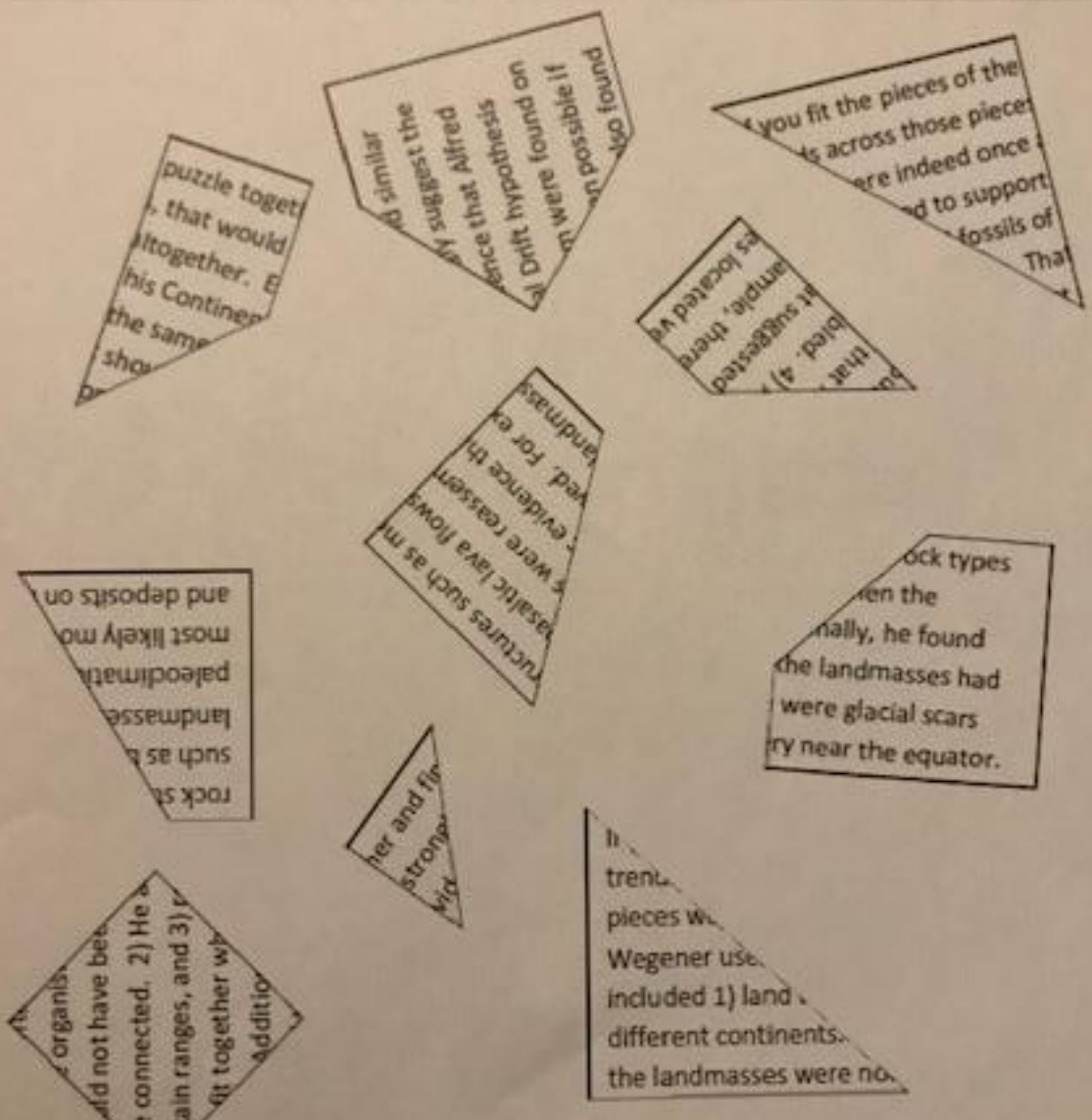
Activity 5: Continental Drift Puzzle

1. Solve the puzzle by cutting out, arranging, and gluing together the pieces of puzzle on the top of the following page.



Name: _____

Activity 5: Continental Drift Puzzle

2. Besides the shape of the pieces, what evidence did you use to support that you put the pieces in the correct places? _____

Alfred Wegener wrote about the evidence he had collected regarding his hypothesis of continental drift: ***"It is just as if we were to refit the torn pieces of a newspaper by matching their edges and then check whether the lines of print ran smoothly across. If they do, there is nothing left but to conclude that the pieces were in fact joined in this way".***

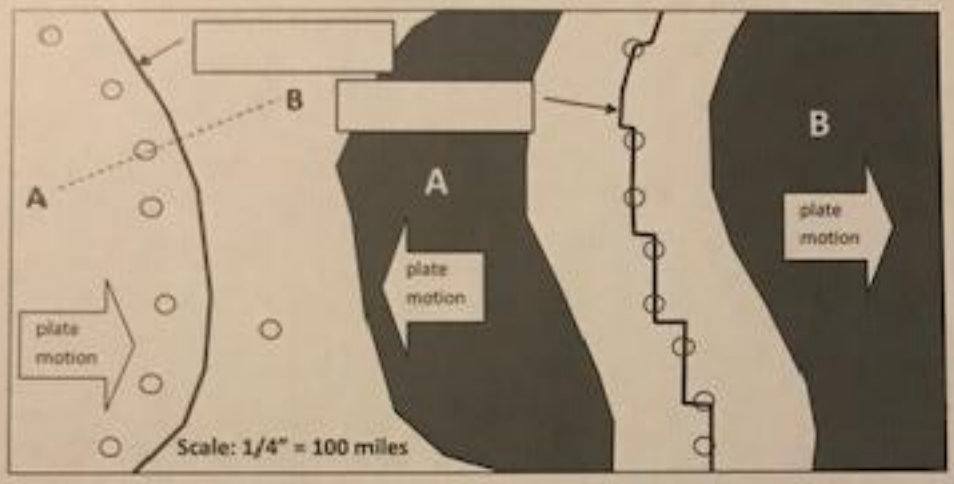
3. Besides the shape of the landmasses, what other evidence did Alfred Wegener collect to support his hypothesis of continental drift?

1. _____
2. _____
3. _____
4. _____

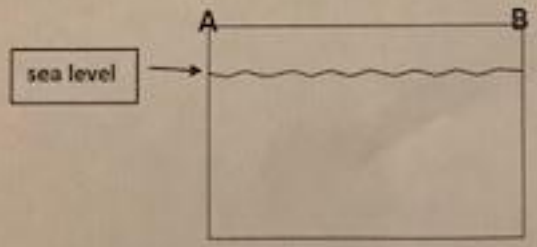
Name: _____

Activity 6: Plate Tectonics Map Activity

In the map below 'A' and 'B' are landmasses, and the small circles represent active volcanoes. The three arrows show direction of plate motion.



1. Study the map above and identify the bold lines as either a "**convergent**" or "**divergent**" plate boundary by filling in the box with the appropriate term.
2. Which plate boundary would be found along a **deep ocean trench**? _____
3. Which would be found at atop an **ocean ridge (spreading center)**? _____
4. Which one would currently be creating new **oceanic crust** (seafloor)? _____
5. Which one would currently be associated with a **subduction zone** and consuming old seafloor? _____ Draw triangular "teeth" spaced out about every ¼" along the subduction zone with the teeth on the over-riding plate.
6. Draw a cross-section of the dashed line A-B in the box below. (Show as much detail as possible.)



7. Which volcanoes do you think are producing **mafic** lava? Darken them in.

8. What composition of lava do you think the other volcanoes are primarily comprised of? _____
What do you call this chain of volcanoes? _____

9. Which volcano is most likely a **'hot spot'** volcano? Mark it with a **'HS'**.

10. There is an extinct volcano (not shown) associated with the hot spot. It is 100 miles away from the active volcano. Based upon the direction the plate is moving, draw the volcano on the map and label it with an **"X"** for extinct. Age dating has shown the extinct volcano to be 2 million years old. This suggests the plate is moving at a rate of _____ miles every 2 million years. To convert this rate to inches per year use the formula below by multiplying all numbers in the nominator (on top), and then dividing by all numbers in the denominator (on bottom).

$$\frac{\textit{100 miles (given)}}{\textit{2 million years (given)}} \times \frac{\textit{63,360 inches}}{\textit{1 mile}} \times \frac{\textit{1 million years}}{\textit{1,000,000 years}} = \_\_\_\_\_ \textit{inches/year}$$

Note: The numerator and denominator are equal values

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11. Assume both plates at the divergent boundary are moving apart at the same rate. How fast are landmasses 'A' and 'B' moving away from each other? _____ inches/year.

12. Using your ruler and the map scale, measure approximately how far apart landmasses 'A' and 'B' are. _____ miles. How far is that in inches? (use formula below).

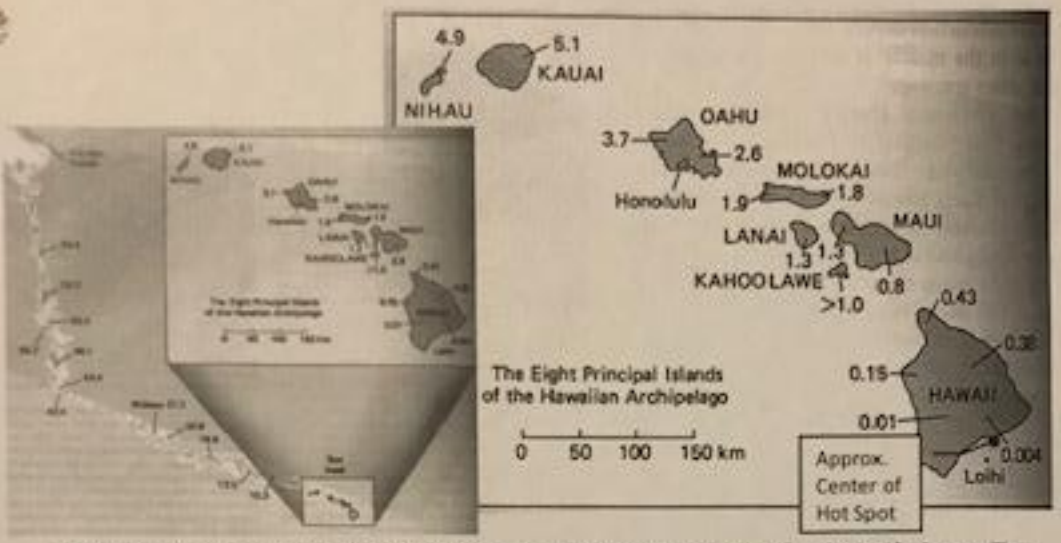
$$\_\_\_\_\_ \textbf{ miles} \times \frac{\text{63,360 inches}}{\textbf{1 miles}} = \_\_\_\_\_ \textit{inches}$$

13. If the landmasses have continually been separating at the same rate, when did the landmass first separate into two landmasses?

$$\frac{\text{total inches of separation}}{\text{inches separated each year}} = \_\_\_\_\_ \textit{ years ago, or } \_\_\_\_\_ \textit{ million years ago.}$$

Name: _____

Activity 7: The Hawaiian Islands



The Hawaiian Islands are the result of the Pacific Plate moving over a "**hot spot**" in the Pacific Ocean. The hot spot is assumed to be stationary within the mantle. Since the southeastern portion of the Big Island of Hawaii still has active volcanoes, and Loihi (a submerged volcano located southeast of the Big Island) is active, let's assume the center of the hot spot is located as shown on the map above. Table 1 below gives the names of the volcanoes associated with their age (in millions of years) in the map above.

1. Using the map scale, measure the distance to each of the volcanoes from the center of the hot spot and record your results in column three of the table.

Table 1.

1. Volcano	2. Age in millions of years	3. Approximate distance from the center of the hot spot (km)	4. Average rate of movement (km / my) (my = million years)	5. Average rate of movement (inches / year)
Mauna Kea	0.38			
Kohala	0.43			
Haleakala	0.8			
West Maui and Lanai	1.3			
East Molokai	1.8			
West Molokai	1.9			
Koolau	2.6			
Waianea	3.7			
Kauai	5.1			

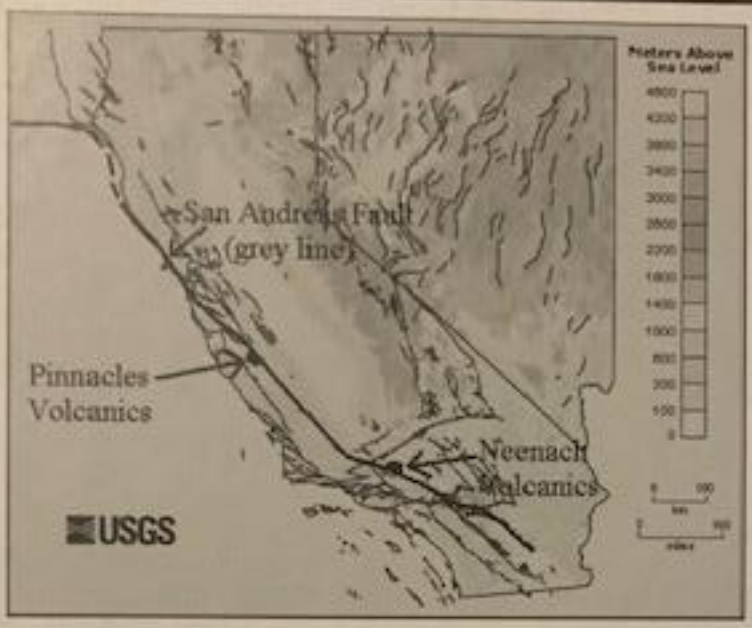
2. Find the approximate rate of movement by dividing the distance by time and record your results in column 4 of the table above.

3. Since km/my is hard to grasp, now convert the rates to inches / year using the formula below.

$$\frac{\text{kilometers}}{\text{one million years}} \times \frac{1000 \text{ meters}}{1 \text{ km}} \times \frac{39.4 \text{ inches}}{1 \text{ meter}} \times \frac{1 \text{ million years}}{1{,}000{,}000 \text{ years}} = \text{\_\_\_\_ inches/year}$$

Name: _____

Activity 8: The San Andreas Fault



The San Andreas Fault

In the 1970's, geologists were looking to understand the nature of movements along the **San Andreas Fault**, and some of them noted the apparent similarity between the Pinnacles volcanic rocks and those of the Neenach volcanics in southern California near Palmdale and Gorman. V. Matthews was able to demonstrate that they erupted from the same volcano, but that the rocks were separated by miles of movement along the fault. These volcanic rocks have been age dated at approximately **23 million years old**. Based on this information, complete the following.

1. Using the mile scale, approximately how far have these volcanic rocks been separated over the years since they erupted as a single volcanic unit? _____ miles

2. Calculate the rate of movement along this section of the fault. **Rate of movement = Distance / Time**

   Rate of movement = _____ miles / million years

3. Convert the rate of movement from miles / million years into *inches / year* using the formula below.

$$\frac{\text{\_\_\_\_\_ miles}}{\text{1 million years}} \times \frac{\text{1 million years}}{\text{1,000,000 years}} \times \frac{\text{63,360 inches}}{\text{1 mile}} = \text{\_\_\_\_\_ inches/year}$$

4. What plate are the Pinnacles Volcanics located on? _____

5. What plate are the Neenach Volcanics located on? _____