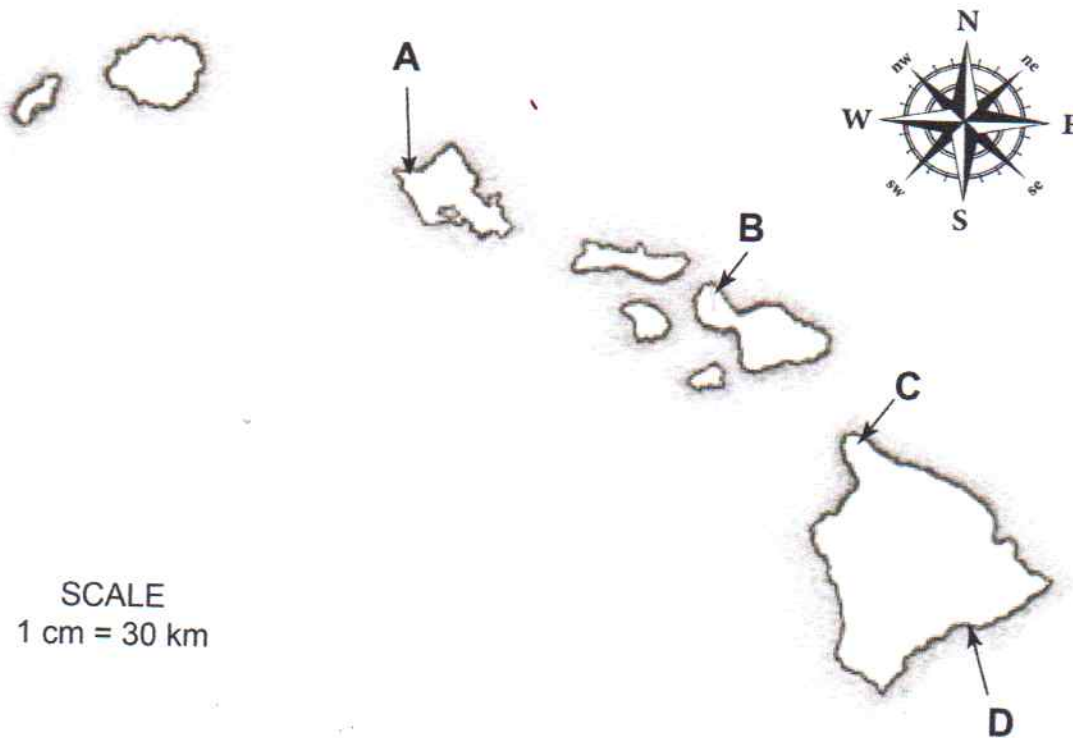


## Rocks of Ages

The rocks found on the islands of Hawaii are very young. Here four samples were collected and their ages calculated based on scientific evidence.

Sample	Age
A	4,250,000 years
B	1,300,000 years
C	700,000 years
D	1 year

Below is the map showing from where these rocks were collected.



### Location of rock samples collected in Hawaii

Let's complete the following table by measuring the distances between each of the locations where samples were collected and calculating the amount of time between the ages of the samples.

Between samples:	Distance measured on map (cm)	Calculated real distance (km) when 1cm=30km	Difference in ages (years)
A-B	4.6 cm	138 km	2,950,000 years
B-C	3.0 cm	90 km	600,000 yrs
C-D	3.0 cm	90 km	699,999 yrs
A-D	9.5 cm	285 km	4,249,999 yrs

Because all of these islands were formed from molten rock being fed from a hot spot below the tectonic plate which is moving, we can use the information in the table to work out how fast and in what direction the plate is moving.

#### Direction

At what location do we find the oldest rocks? A

At what location do we find the youngest rocks? D

If the direction of the plate movement is from the youngest rocks towards the oldest rocks, how would you describe the direction of the plate movement? (Hint: use the compass rose found on the map).

The plate is moving towards the north west

#### How fast

If we use the last row of data we calculated in our table we can calculate the speed of the tectonic plate by following these steps.

STEP 1. We have to convert the real distance between A-D into centimeters. We do that by multiplying the number of kilometres by 1000 (to make it into meters) and then by 100 (to make it into centimeters)

$$\begin{array}{r}
 \text{Number of km} \quad \times \quad 1000 \quad \times \quad 100 \quad = \\
 \underline{285} \quad \times \quad 1000 \quad \times \quad 100 \quad = \quad \underline{28,500,000 \text{ cm}}
 \end{array}$$

STEP 2. We now divide the number of centimeters between A-D by the difference in age between the two locations.

$$\text{Number of centimeters} \quad \div \quad \text{difference in age} \quad = \text{speed of the plate (in cm per year)}$$

$$\underline{28,500,000} \div \underline{4,249,999} = \underline{6.70} \text{ cm/yr}$$

Scientists have done the same calculations between different locations and have calculated that the average speed of the Pacific Plate (that is the name for the tectonic plate that Hawaii sits on) is around 8.1 cm/yr.

Describe the difference between your calculation and what scientists have found to be the average. Why do you think your number may be different from the average speed of the plate?

My measurement is smaller. This could be because of the accuracy of my measurements due to the scale of the map.

The plate could also be moving more slowly at this point as the hot spot feeding the volcanism may be dragging the plate at this point.

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