

## **Laboratory report 07: Latitude, longitude, and the metric measures**

CI

### **Introduction:**

In this laboratory, we explored the mathematical relationship between the metric system meters and the minutes of latitude and the longitude. We developed the concepts of the latitude and the longitude and their orientation on the campus. In this laboratory, we used the relationship of the meters and the minutes for the circumference of the earth. The latitude and the longitude are measured in degrees and minutes. There are 60 minutes in one degree. Around the earth, there are 360 degrees and the latitude and the longitude are measured in distance, not duration of time and space. We used GPS to record the start and the end unit of the latitude and the longitude. When we are walking west along the line of latitude, the longitude value decreases, but when we are walking north on line of longitude, the latitude value increases. We used a surveyor's wheel to provide the second measure of the distance in meters.

### **Equipments:**

- GPS
- Surveyor's wheel

### **Data Gathering:**

Dana gave us the GPS to measure the distance of meters along the line of longitude. MHA was the one who rolls the surveyor's wheel in order for us to find how many meters that we have walked. We start from the A+ center and we stopped under the trees where the huts are. Our line of longitude is E  $158^{\circ} 09.360'$ . We start at N  $6^{\circ} 54.483'$  and ended at  $6^{\circ} 54.595'$ . These numbers are the ones that we used to find the difference in minutes of the latitude along the line of longitude. This is an alternative table .for the walking along the line of longitude

**Data tables:**

Walking along the line of longitude

Line of longitude walked(d)	Starting latitude(d)	Ending latitude(d)	Difference in minutes of latitude along the line of longitude(a)
E 158° 09.560'	N 6° 54.483'	N 6° 54.595	0.11

Measures in meters from the field and the computer laboratory:

Source	Distance( m)
GPS 1	228
GPS 2	224
GPS 3	221
GPS 4	236
GPS 5	231
GPS 6	240
Surveyors wheel	214
Google earth	207
average	225.125
Difference in minute	0.112
meter per minute	2010
Minutes around the earth	26100
Polar circumference	43424

### **Google earth:**

We used Google earth to find the same distance that we walked. Dana shows us how to do Google earth. There were some buttons that we have to click on to show the maps. When we have done gathered all the data, we looked for the polar circumference of earth. The polar circumference of earth is 43,424 kilometers. We calculated the percent error for the circumference and the percent error is 9.38%.

### **Data analysis:**

The following analysis was made based on the number of meters and minutes that we have. We calculated the difference in minutes of longitude along the line of latitude and what we got was 0.112 minute. This was the difference in minutes of the longitude and the latitude. We also calculated the mean distance in meters and the mean distance were 225.125. When we have done calculated the mean distance and the difference in minutes, we looked for how many meters per minute of latitude and we got 2010 meters per minute.

### **Conclusion:**

In this laboratory, there is a mathematical relationship between the minutes and the meters. The relationship was found by using the number of meters and the number of minutes that we have. The line of longitude on the campus was down at the road where people go and see the maintenance office. The line of the longitude was from the parking lot through the capital, Palikir. The line of the latitude was from the dormitory and all the way to the mountains, that's where the line of the latitude runs. On this campus, the north of the campus is different from the other places. The north of this campus is on the road where the maintenance office is. This is where the line of longitude runs.