Measuring the Sky

Turn in one copy of this lab with each group member's printed name and signature. By signing, you certify that you have actively participated in the exercise and have put forth effort in equal share to your fellow group members.

Printed Name	**Signature**
______________________________	______________________________
______________________________	______________________________
______________________________	______________________________
______________________________	______________________________

Measuring the Sky: Part 1 Data

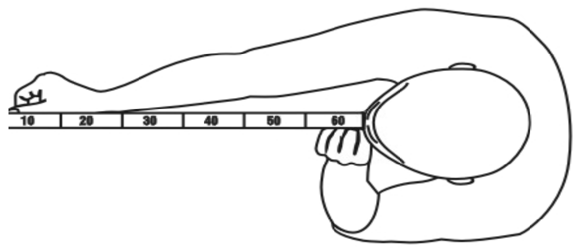

Table 1: Arm Length Measurements

Names (Across and down)					**Avg (cm)**	**PCF (deg/cm)**

Put group member names across the first row AND down the first column. On the row with your name, have each of your group members measure your eye to thumb distance. You can't measure your own, so that cell is blacked out. The last column, PCF, is Personal Conversion Factor.

Table 2: Angular Size Measurements

Distance	Name	Ruler Reading Measured (cm)	Angular size Calculated (Degrees)
10m			
		Average Ang. Size	
15m			
		Average Ang. Size	
20m			
		Average Ang. Size	

Part 1 Questions:

1. What happens to the angular size of the meter stick as it is moved further away?

2. What would the angular size of the 2-meter stick be if it were 100 km away? How many centimeters is that on your ruler? Could you accurately measure that angle? Why or why not?

3. The nearest star (α Centuri) is 1.7×10^9 m in diameter, and 4 light years away. Could you accurately measure this angle? *Answer this qualitatively, not quantitatively.* (1 light year = 9.4×10^{12} km)

4. Since stars are so small, we can imagine the light coming is coming from a single point. Imagine that two observers are on opposite sides of the Earth looking at α Centuri. Does it look like the star is in the same place in the sky to both of them? To find out:

   a) Draw a picture (not to scale) with the star and the observers on the Earth.

   b) Find the angular separation between the photons arriving at each observer. (R_{Earth} = 12,700 km, 1 light year = 9.4×10^{12} km)

   c) Looking at the angle, what can you say about the *lines of sight* from the surface of the Earth to the star? Are they in the same, or different directions?

5. Now you are ready to take measurements for your term project. What challenges do you foresee?

Part 2: Data

Table 3: Mock Landmark observations

Name	Ruler	Angle	Landmark Azimuth

Table 4: Mock Sunset Observations

Name	Date	Time	Ruler	Angle	Sun Azimuth

Part 2: Questions

1. What is the azimuth of the following directions:

   NE: ___________________

   SW: ___________________

   ESE (east-south-east): ___________________

   NNW (north-north-west): ___________________

2. In the picture on page 6 of the packet, the landmark and sunset are to the right of West. If West is 270°, will the azimuth of the landmark be greater than or less than 270°? Will the Sun's azimuth be greater than or less than the landmark's? How do you know?

3. In this lab, you are given the location of West. When you do your observations, you will need to find West yourself. What are some ways you might do this?

4. Looking at Table 4, compare your group's measurements in the **ruler** column. Are they similar? Different? Why?

5. Now compare your measurements in the **azimuth** column. Are they similar? Different? Why?

6. Sometimes you will find that the Sun will start out in a nice clear spot along the horizon, but as the semester goes along, it will move so that the sunset falls behind a building or other obstruction. What are some ways to still get observations, if that happens?