Name(s): _____ _____

_____ _____

Date: _____ Course/Section: _____

Grade: _____

Measuring the Sky

Objectives:

Students will familiarize themselves with altitude and azimuth and estimating angles in the sky.

Checklist:

- ☐ **Complete the pre-lab quiz with your team (if required).**
- ☐ **Compile a list of resources you expect to use in the lab.**
- ☐ **Work with your team to complete the lab exercises and activities.**
- ☐ **Record your results and mark which resources you used.**
- ☐ **Share and discuss your results with the rest of the class.**
- ☐ **Determine if your team's answers are reasonable.**
- ☐ **Submit an observation request for next week (if required).**

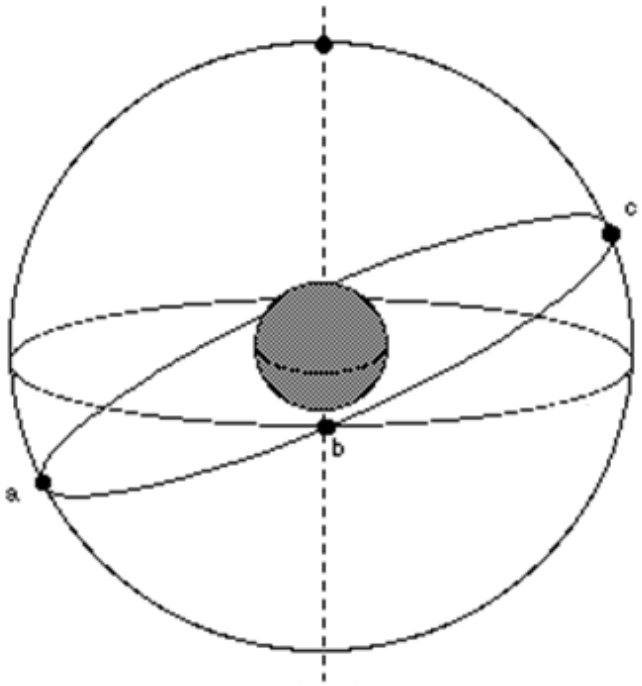
Resources:

Pre-Lab Quiz

Answer the pre-lab questions and explain your answers.

1.
2.
3.
4.
5.
6.

Part 1: The Celestial Sphere



Label the Celestial Equator, Earth's Equator, the North and South Celestial Pole, the ecliptic, the position of Polaris, and Earth's rotation axis. Mark on the diagram where the summer and winter solstice and the autumnal and vernal equinox occur.

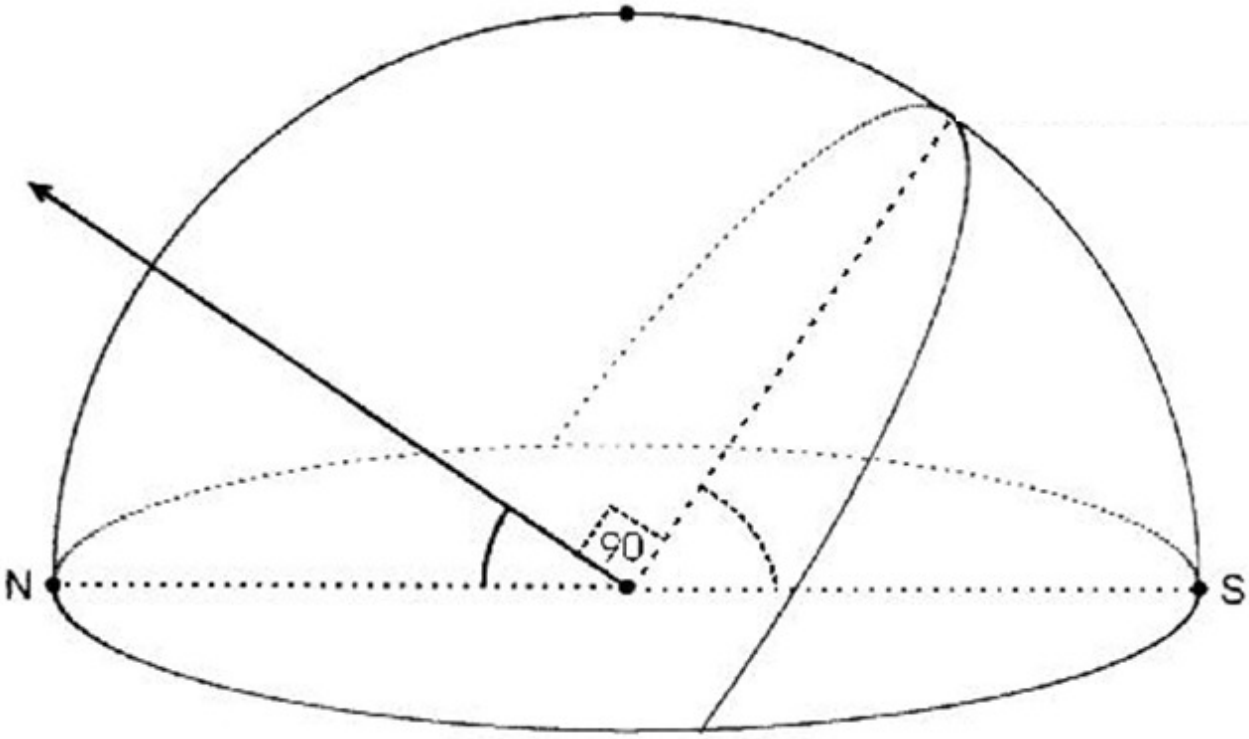
1. What angle is the ecliptic inclined with respect to the celestial equator?

2. What celestial objects lay on or near the ecliptic? (Name at least 5)

The Celestial Sphere: Local Viewpoint

Assume the diagram below is for Iowa City, IA, which is at a latitude of 41.6 deg.(~42deg). Identify the North Celestial Pole (NCP), Celestial Equator, zenith, the meridian, and the horizon. Then, draw where Polaris is.

Then, label the cardinal directions, their azimuth angle, and draw the path of a star over the course of one night.



Think about the ecliptic and how it relates to the celestial equator to answer these questions.

1. What is the Sun's elevation at noon on the Vernal Equinox? Mark it on the diagram above.

2. For Iowa City, what is the elevation of the Sun at noon, on June 21st? Mark it on the diagram above.

Part 2: Parallax

Consult the lab webpage for instructions and record your answers here.

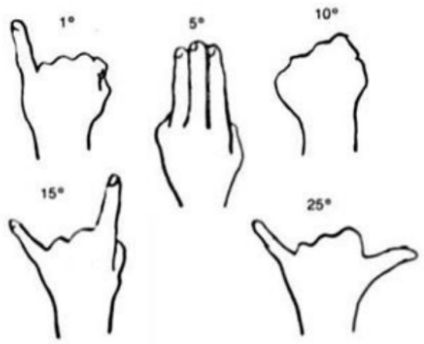
1. What parallax angle does your thumb make when held at arm's length?

2. Using this angle, and the distance between your eyes, calculate the length of your arm.

3. Measure the true length of your arm and compare the two values.

Part 3: Estimating Angles

In this session we will begin the practice of observing the night sky. The main point of this activity will be to estimate the azimuth and altitude of a number of astronomical objects presently in the sky. Familiarize yourself with the figure to the right. It is a handy guide for estimating angles with your hand when held at arm's length.



Measuring the sky with your hand.

1. Before we begin, discuss with your group how you will determine the direction north. Write down your ideas.

Observations on the Roof

1. Determine the direction north. Together with your lab group partners, discuss how you would trace out the meridian on the night sky. Demonstrate the meridian to your TA.

_____ TA

2. The TA will point out some astronomical objects currently in the sky. Estimate the Azimuth angle and the Altitude of the objects in the chart below. Plus or minus about 10 degrees is good enough.

Object	**Azimuth Angle (degrees)**	**Altitude Angle (degrees)**
Saturn		
Jupiter		
Polaris		
Vega		
Deneb		
Altair		

Antares		
Arcturus		
Cassiopeia		
Pegasus		

3. Now estimate the angular size of the constellations listed below.

Object	Angular Size (degrees)
The Moon	
The Great Square of Pegasus	
The Summer Triangle	
The Big Dipper (from handle to ladel)	

If It's cloudy.

If it is cloudy, we'll have to substitute artificial lights in the night. Estimate and record the azimuth and altitude angles of the following objects.

Object	Azimuth Angle (degrees)	Altitude Angle (degrees)
Penthouse on Hotel Vetro		
Dome of Old Capitol		
Dome of City High School		
Kate Daum dormitory		
Radio transmitter lights to northeast		