

Exoplanet Names: \_\_\_\_\_

### **Introduction to Astronomical Observations In-Class Lab**

This exercise is designed to familiarize you with the basics of finding and tracking celestial objects and using basic astronomical tools. It will also start you thinking about celestial motions and the rotation, revolution and tilt of the earth's axis

#### **Lab Objectives**

1. Learn to use basic astronomical tools such as a planisphere and “fist-and-finger” measurements.
2. Explore the reasons why your view of the sky will differ with time and location.

#### **Lab Materials**

Planisphere

Fist and Finger Measurement Guide (included on “Top 10 Tips for Observing Assignments”)

### Exercise 1 – Rising and Setting

1. The rivet in your planisphere represents the north star. If you rotate the planisphere so that time moves forward (pick a date along the outer wheel and move it along increasing times on the inner wheel), do the stars move *clockwise* or *counterclockwise* (circle one) around the north star?

*Note that what you are doing here is mimicking the rising and setting of the constellations. If you keep time moving forward, things will be rising (coming into view on your planisphere) in the East and setting (falling out of view on your planisphere) in the West.*

2. Keeping time moving forward, rotate your planisphere until the following constellations come above the horizon: Leo, Cassiopeia, Lyra, and Orion. Complete the table below by filling in the rising and setting times for each constellation *on today's date*.

**Today's Date:**

<b>Constellation</b>	<b>Rising Time</b>	<b>Setting Time</b>
Leo		
Cassiopeia		
Lyra		
Orion		

3. Were you unable to complete the table for any of the four constellations? Which one(s) and why?
4. Add a column to the table above equal to the total amount of time (in hours) that each constellation is above the horizon on today's date.
5. Describe the relationship between the total amount of time that you computed in question 4 and the location of that constellation relative to a landmark or landmarks on the celestial sphere (e.g. pole, equator). A sketch may help.

## Exercise 2: Variations in the Sky with Time

1. Manipulate your planisphere to show the sky on September 1<sup>st</sup>, 15<sup>th</sup> and 30<sup>th</sup> at a specific time (any time will do, but it should be the same time for all three). Record the time you chose and describe in words how these views differ. For example, you might describe certain stars or constellations that are or are not visible in one case versus another.

Time:

September 1<sup>st</sup>:

September 25<sup>th</sup>:

September 30<sup>th</sup>:

2. Choose a single day in September (any day will do, but record it) and do the same for three different **times** – 9pm, midnight and 3am. Describe how these views differ. Is the difference bigger or smaller than for the last question and by how much? This is a good place to employ a fraction and give a quantitative estimate. Ask for help if you're not sure how.

Date:

9pm:

Midnight:

3am:

3. The two questions above asked you to compare the variation in the appearance of the sky at the same time over the course of one month (#1) and at different times over the course of one night (#2). In which case was there more variation and why? Connect this to the cause of the variation (earth's rotation or earth's revolution).

### **Exercise 3 – Zodiac Sign**

1. For each group member, set the date and time on your planisphere to noon on that person's birthday. Use a book or notebook to lay a straight line along the middle of your planisphere from the "North" label to the rivet at the top of the planisphere (this line is called the meridian, and it marks halfway between east and west, which is where the sun should be at noon). Find where the book or notebook intersects the line labeled "ecliptic". Which constellation is this point closest to? Does it match what you believe to be your zodiac sign? In principle it should, as this is the location that the sun is in at noon on your birthday, which is the definition of zodiac sign, but in practice you will find that it is often not the case. Record each person's name, birthday, planisphere zodiac sign, and believed zodiac sign in the table below.

<b>Group Member</b>	<b>Birthday</b>	<b>Planisphere Zodiac</b>	<b>Believed Zodiac</b>

2. Based on what you learned in in-class lab #1, why are the values in the third and fourth columns often different?

#### **Exercise 4 – Measuring Angles**

*Use your “fist and finger” measurement guide to complete the following exercise.*

1. Have each member of your group stand with their backs against the back wall of the classroom and complete a “fist and finger measurement” of the angular size of the front wall of the classroom. Enter the measurements for each individual group member in a table, as well as the average of the measurements. Comment on the accuracy of this method for measuring angular sizes using specific numbers that you measured/computed.