

EQUIPMENT INTRODUCTION

Purpose: The purpose of this lab is to begin to familiarize you with the sky, the telescopes, making and recording observations, and angular measurements, all of which you use throughout the rest of the semester.

This lab involves several different kinds of tasks, most of which will center around the telescope. Before starting, wait for instructions on where to get the telescopes from, how to move them, and how to set them up for viewing. Once that is done, you are ready to begin.

Background information – where to look

The telescope has three different viewing tools. At the bottom end of the tube, light emerges from the mirrors, and is diverted sideways by a 45° flat mirror located inside a piece that looks like an elbow. At the end of the elbow you should insert the 40 mm eyepiece given to you, as instructed. The eyepiece is one of the three viewing tools. The second viewing tool is a small finder telescope, mounted onto the telescope tube, which has two lenses. The third is a black rectangular box called the Telrad. It can be turned on with the knob on its side. When looking through the glass part, you should see a red bulls-eye projected onto the sky. Check to make sure the Telrad works. If it does, wait for instructions on how to point the telescope.

Aligning the optics

First, you will be checking the telescope to make sure that the three different viewing tools are all aligned. In other words, we will confirm that all three tools are looking at the same part of the sky. To do this, steer the telescope at the Moon or other bright (and large, if possible) object, and center it in the Telrad. Hopefully, if everything is aligned well (as it should be), you should be able to see the Moon in the finder scope, and if you're really lucky, in the eyepiece too. Center the Moon in the finder scope, and then it should appear in the eyepiece. If the 3 tools are aligned, the Moon should be visible in the center of all 3 tools at once. If this is not the case, get assistance from the instructor or TA.

Your main task

Once your optics are aligned, each member in your group should sketch all 5 of the following objects and their immediate surroundings, as seen through the eyepiece.

Objects to observe. You might want to read page **Error! Bookmark not defined.** about how to use the planisphere.

<u>Spring</u>	<u>Fall</u>
1) Moon (rough sketch)	Moon (rough sketch)
2) A planet (not Earth)	Antares (in Scorpius)
3) Another planet (not Earth)	Arcturus (in Bootes)
4) Sirius	Vega (in ...)
5) Gomeisa (see below)	Alcor & Mizar (look in the Big Dipper)

Gomeisa is the 2nd brightest star visible in the constellation Canis Minor.

If class is nearing the end (10:10pm or later), and you haven't found #5, get assistance.

Sirius is the second brightest star visible from Earth. Vega is also quite bright, probably the brightest star in the sky when you see it. For ½ point of extra credit, what is the brightest star ever visible from Earth? Write it down in the "notes." Don't tell anyone else!

For 1 pt of extra credit, sketch either the Orion nebula (M42 – in fall semester) or the Double Cluster, near Cassiopeia/Perseus. This should be the absolute last thing you do in class tonight, and only if time permits.

Equipment Introduction

You will NOT be told anything else about where to find these objects. However, you will get one hint for Gomeisa: it is relatively near Sirius (but not within the finder scope). You may ask if you are pointed at the correct objects, however you should not have to ask “Is this Jupiter?” You’ll know those two when you see them, I hope! The other planets and stars may not be as easy to identify, but they’ll look bigger than dots in the telescope. While one person is sketching, the rest should be planning which objects to observe!

Important note: Below you will find more information you should include on each observation sheet!

After sketching, you should record the following in the “notes” section of the observation sheet:

- a) the altitude
- b) the azimuth
- c) which direction the object is (example: northeast)
- d) for the two stars: Sirius and Gomeisa, give their magnitudes (see a sky atlas – watch out for the error given in the “Using the atlas” handout!)
- e) general features you couldn’t convey by drawing but that you clearly observed. You should have at least one observational “note” for each object (as well as any comments you feel you want to share), in addition to the required information stated above. Feel free to record your notes in the observation circle, if appropriate.

You should also fill in all of the blanks on the observation sheet except the RA. Don’t worry about what “Label NSEW!” means.

Make sure that each of your completed sketches has **instructor’s initials** in the indicated box.

The last task – Don’t forget this!!

Watch any one of the above objects for 2 minutes in the eyepiece, and record what happens in the “notes.” Highlight (with color, borders, etc.) your observation to make it easy for me to find when grading.

Your grade for this lab

Each sketch except #5 (Gomeisa or Alcor/Mizar) will be worth 4 points, as follows: ½ pt for a reasonably accurate sketch of the object, 2 pts for filling in the observation information correctly, 1 pt for reasonably correct altitudes and azimuths, ½ pt for notes/comments. No credit will be awarded if initials are missing from the “assistant’s initials” box! Sketch #5 will be worth 2 points, and 2 points will be awarded for your results from “the last task.”

In addition to the 20 points for the observation sheets, you are expected to answer the following questions, based on your experience. Each question is worth 1 point.

- 1) Every night, the first task you will be performing with the telescopes, after setting them up for use, is to check that the 3 viewing tools are aligned. Why is this important? Be specific. (Hint: through what tool do you initially find the object? Through what tool will you make observations?)
- 2) Altitude is measured relative to eye level, rather than relative where you first see sky instead of Earth stuff. Why? (This is not obvious to most students – think about it.)
- 3) Hopefully you noticed that objects moved in the eyepiece as time progressed. A) Why do they appear to move? B) In which direction are they moving? (Hint: stars rise and set, just like the Sun.)
- 4) Do telescopes need electricity in order to work? Defend your answer based on your experience with this lab.
- 5) In the future, we will need to keep objects centered in the eyepiece, instead of letting them drift. How can we keep objects in the center of the telescope? You should think of 2 ways: one done by hand, and one done electrically.

Equipment Introduction

Note: you may not write a lab report for this lab.