

**29:50 Astronomy Lab**  
**Stars, Galaxies, and the Universe**  
**Fall 2007**  
**Observing the Night Sky I**

**Name:**.....

**Date:**.....

**Introduction**

In this session we will observe the night sky. The idea is to fix some of the concepts discussed in class, such as the celestial coordinate system. However, the main point is to see the night sky and notice some of the properties of stars and some other astronomical objects such as star clusters and galaxies. This will make them seem more real as we discuss them throughout the semester.

Part of the activity will consist of finding stars, constellations, or other astronomical objects. To show that you have found an object, you point it out to a teaching assistant or other observer, who will then “sign off” on it for you.

In going through these exercises, you will have a chance to use the Sky and Telescope star wheel, the SC1 constellation chart, and the Sky and Telescope Pocket Star Atlas. In using the pocket star atlas, you will need a pair of binoculars to see objects fainter than the naked eye limit. Here goes.

**Finding Stars and Constellations**

- (1) Get yourself oriented so you know which directions are north, west, etc. Find Arcturus, in the constellation of Bootes, and point it out to the teaching assistant.  
.....
- (2) Using a combination of the Sky and Telescope Star Wheel and the SC1 chart, find the stars Deneb, Vega, and Altair. Find at least a couple of other stars in the constellations of Cygnus, Lyra, and Aquila, which contain these three bright stars. Point them out to one of the observing assistants.....
- (3) Find the constellation of Pegasus (the “Great Square” of Pegasus), as well as the constellation of Andromeda which is attached to it. Point these constellations out to the observing assistants.....
- (4) By the end of the session, there will be a bright star rising in the northeast. Find it and identify it. Which star is it, and in what constellation?  
.....
- (5) Be sure and notice where the various constellations are in the sky (i.e. constellation X is low in the northwest, constellation Y is about halfway up the

eastern sky). When we do this again later in the semester, you should note the differences in the sky.

- (6) Notice where the Moon is relative to the background stars. Describe where it is relative to the surrounding constellations. ....
- (7) **Roughly** estimate the Right Ascension and Declination of the Moon. Next week in class, your TA will tell you the right values. To see how close you were, write down your values somewhere and keep them for later reference.  
**RA....., Dec.....**
- (8) Now let's try and find a "Deep Sky" object using the Pocket Sky Atlas. We will look at the object M13 in the constellation of Hercules. Using the Star Wheel and SC1 chart, find Hercules. Both the Star Wheel and the SC1 indicate where M13 is located. The Pocket Sky Atlas has a more detailed map of the part of Hercules around M13. Use a pair of binoculars to look at the region of M13, and locate the object. You will see it as a faint smudge of light instead of a star image. Draw a little picture of what you see in the margins of this document. Point out to the teaching assistant where you are looking, and what you see.  
 ..... M13 is a type of object called a *globular star cluster*. At the end of the night, look in your textbook (see p530) at a picture of a globular star cluster. A typical globular star cluster is a swarm of about 100,000 stars. They contain some of the oldest stars in the universe, which formed billions of years before the Sun. The distance to M13 is 21,000 light years. The light you are seeing tonight was emitted by those stars many thousands of years before any civilizations existed on Earth.

### Estimating Stellar Magnitudes

We will now try estimating (a rough measurement) apparent magnitudes of some stars. In this part of the exercise, you are using your eyes as a scientific instrument, as was done in the science of astronomy up until the 1920s. The table below gives the apparent magnitudes of some stars, and their apparent magnitudes. Find the stars and look at them, and notice the differences in their brightness.

Star	Constellation	Apparent Magnitude
Vega	Lyra	0.0
Deneb	Cygnus	1.3
Zeta UMa (handle of Big Dipper)	Ursa Major (Big Dipper)	2.3
Eta Pegasi	Pegasus (next to Great Square)	3.0
Delta Lyrae	Lyra (in the little parallelogram below Vega)	4.3

After looking at these stars, and their magnitudes in the above table, you should be able to "calibrate" your eye so that it can measure apparent magnitudes. Find the following stars in the sky, and estimate their apparent magnitudes. Try and estimate to 0.5

magnitudes. Go back to the above table to refresh your memory. Write down your estimate of the apparent magnitude in the column provided.

<b>Star</b>	<b>Constellation</b>	<b>Apparent Magnitude</b>
Altair	Aquila	
Albireo (Beta Cygni)	Cygnus (end of the "Northern Cross")	
Alpha Capricorni	Capricornus	
Mu Andromedae	Andromeda	