SIERRA COLLEGE OBSERVATIONAL ASTRONOMY LABORATORY EXERCISE		
NUMBER I.B.	**TITLE: Naked Eye to Eyepiece (Fall)**	
DATE- **DAY-** **LOCATION**	**PRINT NAME/S AND INITIAL BELOW:**	**GROUP** ☐

OBJECTIVE:

- To acquaint the observer with the astronomical applications of binoculars
- To demonstrate the proper set-up and dismantling of a small telescope (Meade or C-8)
- To become familiar with the application of the HORIZON and CELESTIAL coordinate systems

DESCRIPTION:

A great amount of information can be gathered with the unaided eye. However, since the human eye is limited in its ability to gather light, optical assistance is often needed to view and collect information about celestial wonders such as planets, stars, star clusters, nebula, and distant galaxies. Since the invention of the telescope over 400 years ago, astronomers have been probing deeper into the universe to unravel its mysteries. In this exercise, the observer will start with two telescopes (one for each eye) otherwise known as binoculars. Their optical characteristics will be analyzed and recorded in this exercise. The set-up of a Meade (or Celestron '8') telescope will also be discussed with references to the proper procedures outlined in the Bluebook. An introduction to how objects are found in the night sky will be addressed under the topic of coordinate systems. The terminology below will be helpful in better understanding this exercise. The instructor will discuss the definitions early in the session.

TERMINOLOGY:

CELESTIAL SPHERE (see Celestial Globe or Planetarium)

HORIZON

ZENITH (AND NADIR)

CARDINAL POINTS

MERIDIAN

AZIMUTH

ALTITUDE

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CELESTIAL POLES (NORTH AND SOUTH)

NORTH STAR AND OBSERVER'S LATITUDE

HOUR CIRCLES

RIGHT ASCENSION

DECLINATION

MAGNIFICATION AND LIGHT GATHERING PROPERTIES

FIELD OF VIEW

PROCEDURE:

1. Take turns handling the four sets of binoculars (A, B, C & D). Observe near and far objects (inside and outside) and complete the information requested in table 'A'. The instructor will explain some of the observations as you get started.

TABLE A – BINOCULARS

Set	**Magnification** '**X**'	Objective Diameter	Field (^{o}) of View Observed	Published	Comments
A				6.97 ^{o}	
B				7.14 ^{o}	
C				4.48 ^{o}	
D				3.49 ^{o}	

2. Go outdoors and observe the stars in table 'B'. Observe with naked eye and binoculars. Estimate the Horizon Coordinates by the 'fist' method described earlier. Enter your results in the table along with the computer values of the same coordinates. Using the computer results, enter the equatorial coordinates as well. Note your Horizon Coordinate differences in the appropriate part of the table. Also record the date and Pacific Standard Time of your observations.

TABLE 'B'

DATE = _____ P.S.T. = _____(AM/PM)=_____(24H)

STAR	AZI Observed	AZI Computer	Diff	ALT Observed	ALT Computer	Diff	R.A. Computer	DEC. Computer
Vega								
Deneb								
Altair								
Arcturus								
Alkaid								
Polaris	**xxxx**	**xxxx**	**xx**					

SETTING UP THE TELESCOPE (See Bluebook; Section D):

3. Set up the Meade (or Celestron) Telescope in the classroom. Instructor will step you through the process described in the Bluebook. Be Careful and TAKE NOTES!

4. (Celestron only) After the instructor checks each set-up, aim the telescope so that it would be pointing towards the star **VEGA** as if set up outside.

   Instructor will check your results when finished. _____

5. If time permits, repeat the set-up procedure **outside**.

QUESTIONS:

1. Which set of binoculars produced the brightest image?

2. Which set of binoculars produced the largest image?

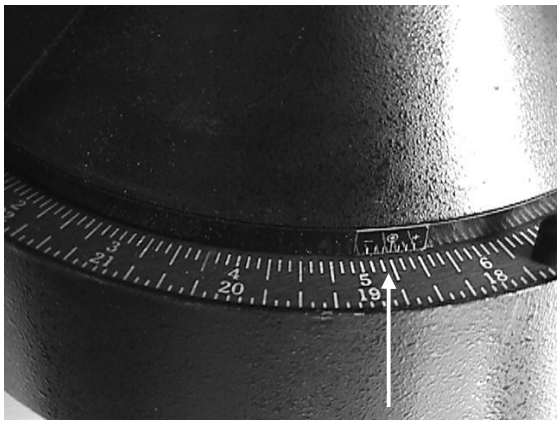
3. Which set of binoculars were hardest to hold steady, or which set had the smallest field of view?

4. Two stars with the same Right Ascension have declinations of 45^{o}N and 51^{o}N. Which binoculars would enable you to see both stars in the same field (A, B, C, D). (Use published FOV)

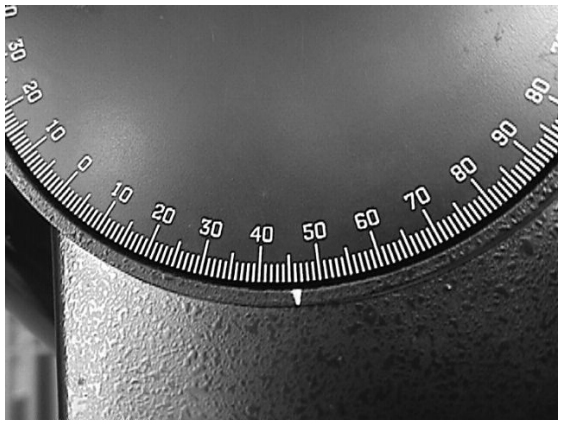
5. Did stars viewed through the binoculars differ in color? Elaborate

6. Which coordinates (Horizon or Celestial) change with time?

7. Examine the pictures below and determine what bright star the telescope (properly oriented for time and location) would be pointed towards. Use your SC-001 chart to get the answer.



Right Ascension: Always read the inside circle while in the Northern Hemisphere



Declination (North)

8. How does the altitude of Polaris compare with the observer's latitude?

9. Does the Right Ascension and Declination of a star change throughout the evening?

10. The longest focal length eyepiece will give the lowest magnification for the Celestron (or Meade) telescope. Which of the three eyepieces provided (focal length) will give the highest magnification power?

11. In the previous question, would this 'highest power' eyepiece produce the **largest** or **smallest** field of view?

Bluebook Summary – List the important steps in setting up and dismantling the Meade (or Celestron-8) telescope, emphasizing the precautions you should take.