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## Exploring the Sky I

## Pre-Lab Quiz

Record you team's answer as well as your reasonings and explanations.

1.

2.

3.

4.

## Part 1: Using a Star Wheel

1. Dial up 9 pm on your star wheel by aligning today's date with 9 pm. Find a constellation that has just risen. Find a constellation that has just set.

**Hint:** how can one simulate the passage of time throughout the night on a star wheel?

Constellation – Just Risen	
Constellation – Just Set	

2. The point about which the sky rotates in the northern hemisphere is called the *North Celestial Pole* (NCP). What star is associated with the NCP and what constellation is it part of?

3. The *zenith* is defined as the point on the celestial sphere directly above an observer. On the star wheel, the zenith will be at the center of the visible portion of the sky. What constellation will be closest to the zenith at 9 pm tonight?

4. The *meridian* is a great circle on the celestial sphere that passes through the north and south celestial poles and an observer's zenith. List some constellations that will be along the meridian at midnight tonight.

5. The word *circumpolar* is used to denote objects that never set below the horizon, and thus are visible at all times of the year.

a) Using the star wheel, list three circumpolar constellations for Iowa City.

b) Where would one look to find them?

6. Where would one currently look to find *Ursa Major* (Big Dipper)?

7. The Summer Triangle consists of the three bright stars *Altair*, *Deneb*, and *Vega*. While it isn't a constellation, it is one of the most famous "asterisms" (pattern of stars) in the night sky. During which months will it be visible at midnight?

8. The Orion constellation is home to the picturesque Orion Nebula, a popular target for amateur astronomers (*The Stargazer's Handbook*, pg. 124). Will Orion be visible tonight? If so, during what times? If not, when will it become visible in the early morning (4 am) again?

9. More than half of all stars are thought to be part of a system with two or more stars. Two of the most famous multi-star systems are *Mizar-Alcor* and *Albireo*.

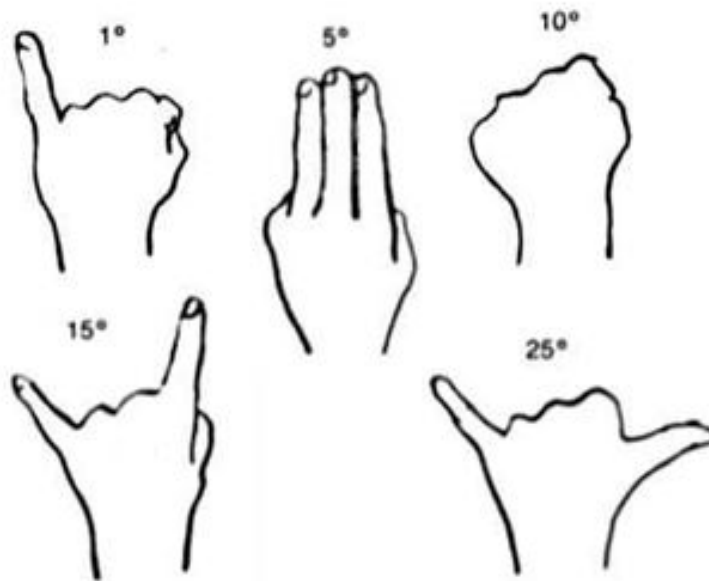
a) Mizar-Alcor (pg. 34) is part of the constellation Ursa Major. What is special about this system?

b) Albireo (pg. 54) is part of the constellation Cygnus. Why is this a popular object for viewing with a small telescope?

10. Arcturus (*Guardian of the Bear*) is the fourth brightest star in the night sky and is located in the constellation Boötes. Draw a diagram of the Big Dipper and illustrate how to find Arcturus and Polaris using the Big Dipper as your starting point. Also label Mizar-Alcor.

## Part 2: Estimating Angles

In this part we'll practice measuring the sky. The main point of this activity will be to estimate the azimuth, altitude, and angular size of a number of objects. The figure below is a handy guide for estimating angles with your hand when held at arm's length.



1. Determine the direction North. Determine the direction of East. Describe how you would show someone the position of the meridian through the sky.

2. Depending on the weather and your lab section, proceed to the proper section. Note the following definitions:

*Azimuth* – angle around the horizon, starting from North and increasing to the East. Ranges from  $0^\circ$  to  $360^\circ$ .

*Altitude* – angle above the horizon. Ranges from  $0^\circ$  at the horizon to  $90^\circ$  at the zenith.

### Cloudy or Day Lab

For each of the following objects, estimate their azimuth angle and their angular size. Your TA will point out any objects that you need help identifying.

Object	Azimuth Angle	Angular Size
Hotel Vetro		
Old Capitol Dome*		
Grey Stone Church to the Northwest		
VAO Telescope Dome†		

\* Just the dome at the top

† Viewed from the entrance to the roof.

### Fall Night Lab with Clear Skies

Your TA will point out several objects in the night sky. Record their names and estimate the various quantities.

**Note:** Remember, the altitude should not exceed  $90^\circ$ .

Star	Azimuth Angle	Altitude Angle
Alcor-Mizar		
Albireo		
Arcturus		
Polaris		
Vega		

Object (Type)	Angular Size
Summer Triangle (Asterism)	
Big Dipper (Asterism)	
Cassiopeia (Constellation)	



**Rainy or Very Cold Weather Lab: VAN 666**

For each of the following objects, estimate their azimuth angle and their angular size. Your TA will point out any objects that you need help identifying.

Object	Azimuth Angle	Angular Size
Hotel Vetro		
Tower Place Parking Ramp Clock Tower		
VAN Lecture Halls Roof		
Lab Room Door from Your Lab Table		

**Rainy or Very Cold Weather Lab: VAN 665**

For each of the following objects, estimate their azimuth angle and their angular size. Your TA will point out any objects that you need help identifying.

Object	Azimuth Angle	Angular Size
Linn Street Crosswalk		
Clock Tower Clock Face to the North		
Grey Stone Church to the Northwest		
Lab Room Door from Your Lab Table		