

ASTRO 1810 - Observing Field Trip To Glenlea - Sketching the Fall Sky

You will sketch three asterisms/constellations in the Northern sky : The Big Dipper, The Little Dipper, and Cassiopeia as well as three constellations in the Southern sky : Lyra, Aquila, and Cygnus. The sketches must be completed and handed in during one of the observing sessions that will take place throughout the term and turned in at the end of the observing session. You are responsible for attending one of these.

Before you observe:

1. Read "Notes on Observing" **thoroughly. Bring warm clothes, a couple pencils, paper, and something hard to write on.**
2. Use Starry Night, Stellarium, or other planetarium program to identify and locate your targets.
3. The Glenlea Astronomical Observatory (GAO) is at longitude 97.12°W and the latitude is 49.65°N and has an elevation of 233m.

Mythology of the Constellations:

(Source: <http://www.constellation-guide.com/constellation-list/>)

Ursa Major (Ursae Majoris) UMa: (The Great Bear, The Big Dipper, The Plow) : Through all ages, Ursa Major has been known under various names. It is linked with the nymph Kallisto, the daughter of Lycaon, a king of Arcadia in Greek mythology.

Ursa Minor (Ursae Minoris) UMi: (The Little Bear, The Little Dipper) : The origin of this group is uncertain and has also been referred to as the Little Dog belonging to Kallisto.

Cassiopeia (Cassiopeiae) Cas: (The Queen, The Chair, or, The Throne) : One of the oldest and best known constellations is also known as the celestial W (M) when below (above) the Pole. In myth, Cassiopeia was the vain wife of king Cepheus and mother to Andromeda, nearby constellations.

Lyra (Lyrae) Lyr: (The Lyre) : A stringed musical instrument used in antiquity, the lyre is associated with the myth of Orpheus, a Greek musician and poet. Upon his death, the lyre was thrown into a river and Zeus sent an eagle (Aquila) to get the lyre and then placed them both in the heavens.

Aquila (Aquilae) Aql: (The Eagle) : In Greek myth, Aquila is identified as the eagle that carried Zeus' thunderbolts. In another, Aquila represents Aphrodite disguised as an eagle, pretending to pursue Zeus, disguised as a swan. Zeus placed the eagle and the swan among the stars to commemorate the event.

Cygnus (Cygni) Cyg: (The Swan, The Northern Cross): The most frequent myth involves Zeus transforming himself into a swan to seduce the Spartan Queen Leda. Cygnus is also sometimes identified as Orpheus who was murdered. After his death, Orpheus was transformed into a swan and placed next to his lyre in the sky.

Sketch 1 : Sketching the North Circumpolar Cap

As soon as you get to the observatory sketch the **Big Dipper, the Little Dipper and Cassiopeia** on **one full page diagram** making sure that their relative brightnesses as well as their relative positions to each other and to the horizon are drawn as accurately as possible. This means completing the sketch in about 15 minutes.

Draw the **horizon** and **label the applicable cardinal points**. If in your field of view, draw an "X" for **zenith**, and a dashed line for the **meridian**. Include details of the observation: **date, time, location, sky conditions**. Please see sample sketch for an example of what we are expecting.

Within a constellation, each star is assigned greek letter, usually in order of brightness (α brightest). References to stars as α UMi, said alpha Ursae Minoris, literally means alpha of Ursa Minoris (brightest star of Ursa Minor). Note that the constellation Ursa Major is a major exception to this rule, ordered instead from spout to handle.

For Ursa Major:

1. Moving along the asterism of the dipper from the lip identify and label the stars: Dubhe (α UMa), Merak (β UMa), Phecda (γ UMa), Megrez (δ UMa), Alioth (ϵ UMa), Mizar (ζ UMa), and Alkaid (η UMa).
2. Show the relative position and brightness (brighter stars should be drawn as bigger circles) of these stars on your drawing, identifying each with its Greek letter.
3. Locate and record Mizar's faint companion: Alcor.
4. Estimate and record the angular distance between
 - a) the pointer stars, α UMa and β UMa,
 - b) α UMa and Polaris (α UMi),
 - c) between the stars, Mizar and Alcor.

For Ursa Minor :

1. Label β UMi and γ UMi (the "Guardians of the Pole").
2. Estimate the altitude of Polaris, α UMi, above the horizon.

For Cassiopeia:

1. Identify in the sky and sketch the 6 major stars making up "Cassiopeia's Chair".
2. Locate β Cas and label it on your diagram.

Sketch 2: Sketching the Summer Triangle

Sketch the constellations Lyra, Cygnus, and Aquila on a single page. The stars Vega, Deneb, Altair form a bright triangle, known as the Heavenly Triangle or the Summer Triangle.

Lyra (Lyrae) Lyr: (The Lyre)

Lyra was first catalogued by the astronomer Ptolemy in the 2nd century. The brightest star is Vega (α Lyr), which is the 5th brightest star in the sky.

Cygnus (Cygni) Cyg: (The Swan, The Northern Cross)

Locate the main stars outlining this constellation. Mark Deneb, α Cyg, and the binary star, Albireo, β Cyg, on your diagram. Can you see the Milky Way? If yes, then indicate its position through Cygnus by shading.

Aquila (Aquilae) Aql: (The Eagle)

Brightest star is Altair, α Aql.

Sketch 3:

Repeat sketch 1. Make sure at least an hour has passed since you finished your Sketch 1. Pay careful attention to the orientation of the constellations relative to landmarks on the horizon.

After you have completed all three sketches:

Stellar Brightness

After you have completed your summer triangle sketch, look at all the stars in the sky to find the brightest star that you can see. Then locate the faintest stars that you can see. Assign the number 1 to the brightest star and the number 5 to the faintest. Then the brightness of all stars can be assigned numbers between 1 and 5. Note that brighter stars are assigned smaller numbers.

Beside the main stars in your sketches of the constellations Ursa Minor and Cassiopeia, indicate the number between 1-5 corresponding to the brightness of each star. You will have to compare brightnesses of stars. First compare the brightest and the faintest, then compare stars in between. Before marking down any numbers, try several stars and see how you progress. The aim of this exercise is to note that you can subdivide the range and brightness of stars into 5 groups. Assign brightness numbers to the stars in the constellations of Ursa Minor and Cassiopeia.

Using Sketch 1 and Sketch 3, full page sketches answer the following questions:

1. a) Did the positions of these constellations change with respect to each other over the one hour period?
b) Is this what you expected? Why or why not?
2. a) Did the positions of these constellations change with respect to the horizon over the one hour period?
b) Is this what you expected? Why or why not?