

April/May Field Observations

On this evening, you will be locating a variety of objects with the naked eye, binoculars, and telescopes. You will be required to make five sketches of various parts of the sky, as well as objects that you view through a telescope. In your write-up, answer the questions below and provide the details asked for in each sketch. Also include a brief description/introduction to the lab including what you learned, liked, didn't like, and would like to do next time!

Sketch I --As the sun sets, locate the brightest stars and planets as they appear. It is vital that you do this before it gets dark! Decide on the ten brightest stars and map their position on a piece of paper (remember to hold the paper over your head and map the stars as if you are looking through this. Be sure to include North, South, East, and West on your paper as well as the Zenith. Feel free to include any planets (as #11, 12 etc) that might appear. Identify, on your chart the star nearest the horizon in the west, and the star nearest the horizon in the east. You will need these for the next observing lab.

Questions #1 Now, or later, use a star chart, your classmates, and/or a planetarium program such as "The Sky" to help you identify the stars by name, apparent magnitude, and absolute magnitude. You can best answer this question by redrawing your star chart, representing the apparent visual magnitude of stars by the size of the "dot" used to draw the stars, with the name of the star and the numerical values of the apparent visual magnitude, absolute magnitude, and distance next to the dot. Note that the exercises you will do later tonight will also help!

Question #2 Are these ten stars a "random sampling" of the all the stars in the milky way, or is there something intrinsically special about them? What might that be?

Questions #3: Why is the size of the dot used to represent apparent magnitude?

Now its time to familiarize yourselves with the brightest stars in the sky. Look to the west near the horizon, and then scan the skies towards the North. The two brightest objects are the Star **Aldeberon**, in the constellation **Taurus**, and **Cappella**, in the constellation of Augriga. Of the two Stars, Cappella will be much higher in the sky. Aldeberon is the "angry red eye" of Taurus the Bull. Much of Taurus is probably below the horizon.

Eastward of Aldeberon, about thirty degrees is the giant constellation of Orion. Orion is best know by his belt, but the brightest star in Orion is **Rigel** at the bottom right of the constellation (it may be below the horizon). Above the belt, and to the right is the next brightest star in Orion, **Betelgeuse**.

Now, last but not least, find **Sirius**, the brightest star in the sky. Sirius is the heart of the dog, **Cannis Major**. Follow Orion's belt to the west (away from Aldeberon) until you come to it. You will be looking southwest. Its **magnitude** is -1.46.

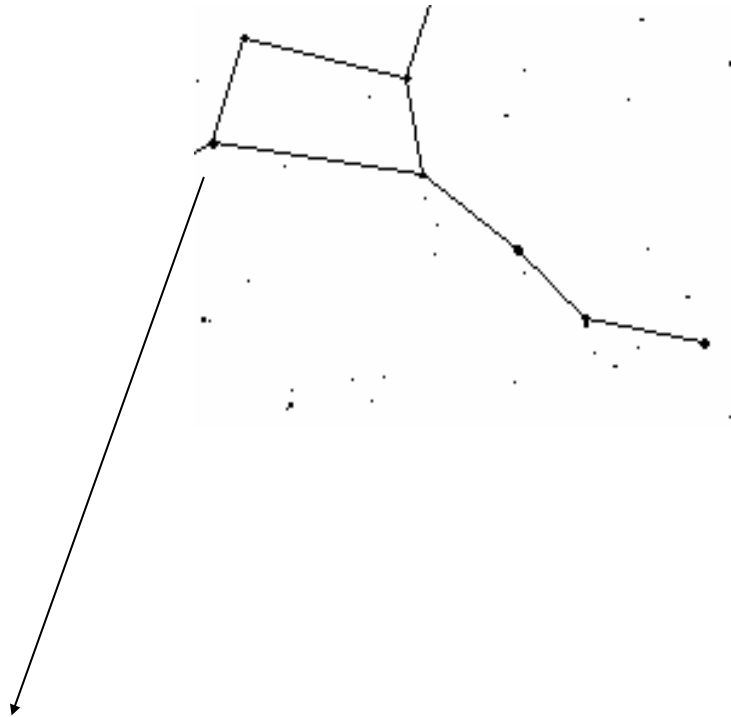
Sketch II--Sketch Cappella, and Aldeberon, Rigel, Betelgeuse, and Sirius in proper relationship to one another. Include Orion's belt in your sketch for perspective. When you get home, make a neater sketch. Be sure to use the size of dots to indicate their relative brightness (i.e. Sirius should be much larger than the others). Include the name of the star's constellation next to its name. When you hand in your lab report, include both the original, and redrawn sketches.

Now for some more important bright stars. Imagine a line extending from Rigel toward the Zenith, just to the left of Orion's belt. The first bright star you come too, way above Orion, and all by itself is **Procyon**. Sirius is the closest bright star, well below and to the left. This star is more or less the entire constellation of **Cannis minor**. To the right of Procyon, about thirty degrees, are the almost twin stars of Gemini, **Castor** and **Pollux**. Pollux is the brighter of the two (at magnitude 1.14 compared to Castor's magnitude of 1.56) If you are looking in the right spot, you will be facing southwest, and then looking about 50 degrees above the horizon.

Now look due South, and then up about 60 degrees above the horizon. You should see one bright star at the bottom of a "question mark". The bright star is **Regulus** and the constellation of the question mark is **Leo**. Once you've identified Leo, look around at the constellations you've just identified. Can you remember them all?

Sketch III--On a separate sheet, sketch the brightest (2- 5) stars in the constellations of Gemini, Leo, Auriga, and Cannis Minor. Show the position of the Moon and planets in this field (if visible) as well.

Now its time to really orient ourselves. Find the big dipper (in Ursa Major). The last two stars in the bowl of the dipper are called "the pointer sisters" since they point to **Polaris**, the north Star. Find the pointer sisters, and the north star (about seven times the distance between the sisters).



Hey its Polaris!

Sorry if you expected Polaris to be brighter. Its only about magnitude 2.02. As the sky grows darker, you will see that Polaris is the last star in the “tail” of the little dipper.

Sketch IV—Sketch the brightest stars of Ursa major and Ursa Minor (yes, the ones that look like dippers!)----Using your fist at arm’s length as a reference for 5 degrees, determine the altitude (number of degrees above the horizon) of Polaris. Include this number in the sketch below.

Question IV: look up and report the correct altitude of Polaris (using the text or voyager). What does this number have to do with our latitude? Explain

Looking back at the big dipper, view the middle star **Mizar** in the handle of the dipper with the naked eye, and then later with binoculars and a telescope. Its really a double-double system. Note that with the naked eye, you can see two stars, but with a telescope, you can see three--two of which are actually in close orbit about one another--so close that even the telescope cannot resolve their separation.

---sketch what you see through a telescope. Be sure to indicate the colors of the stars—you should see a definite difference between them.

Next, follow the arc in the handle of the bit dipper. It arcs over to the red giant star **Arcturus**. The stars just above Arcturus are in the constellation of Bootes. Continue

along the arc until you get to the next bright star. That's **Spica**, in the constellation of Virgo.

Finally, look all the way back to the stars Procyon and Pollux. Starting right between them, imagine a line extending upward until it reaches a bright bluish star...does it look familiar? You are looking at **Regulus** (magnitude 1.35. It forms the period at the bottom of a large question mark, otherwise known as **Leonis** (Leo for short) the Lion.

Sketch V--Sketch this huge part of the sky including Regulus, Spica, Arcturus, the big dipper (showing Mizar and Algol), And Polaris. Your sketes should contain two to five stars from each constellation. Make sure they are labeled and show any planets that are 'wandering' through this field of view.

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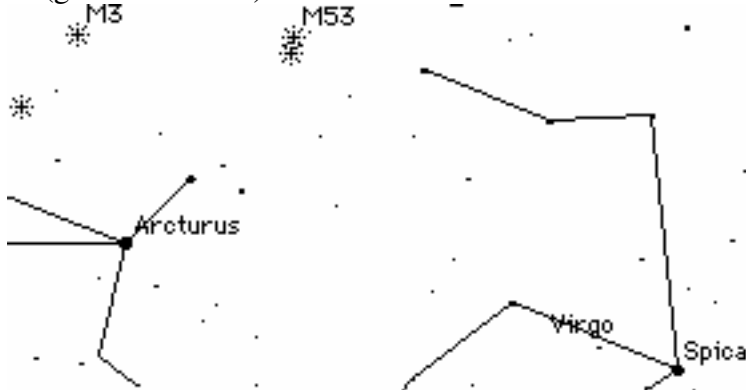
Now, if time permits, you might want to try your hand at locating some "deep sky objects". Your instructor may locate some for you with the telescope.

Sketch VI-- sketch and label what you see through the telescope. If you are on your own, consider trying one of the following:

M51 (whirlpool galaxy) --the handle of the big dipper is shown for reference...



M3 (globular cluster)



Here's what M51 looks like with a long exposure through a large telescope. Without the aid of an imaging device (Camera or CCD) you will only see the brightest regions....

