

## Course Outline, Night-Sky Observing 101 – Naked Eye and Binoculars

THE SCHEME – The moon dominates the nightly stage when she is up. We schedule each series to begin a few days after the new moon when it sets close behind the sun and is a thin crescent. The course ends with no moon in the evening sky. Classes start at 7:00 PM, but the Zoom session open at least ten minutes early giving us time to get everyone on and visit some prior to the presentation. The start date can be found on the Observing 101 page of our website. Subsequent installments follow weekly at the same time and day of the week for two more weeks, three sessions in all.

Each night's program is briefly outlined below with some useful references to explore and a recommended list of observing activities to perform to solidify what you learn. To get the most out of the program you should really plan to doing these exercises. This will not only solidify what you learn, but give rise to timely questions to ask. While a dark sky is nice, for the purposes of the course it is better to find a convenient place reasonably near than a really dark site difficult to travel to. A park outside of town, a field, a rural church yard, your back yard perhaps, if live outside of town. Anywhere where a night light is not nearby and the sky is fairly open will likely suffice. You can always take what you learn on a special outing after the course.

The **first** week's observing activities especially don't require the darkest sky. After the **second** night the moon will be gibbous so observing activity focus is on lunar explorations, finding bright stars and planets and preparing for darker skies to come. By the **third** night we will be entering a two week period of moonless evenings that will extend beyond the third night. For this period a darker sky will be more important and having an observing kit put together.

Beyond the basics outline below, there are optional observing challenges for those wanting to kick it up a notch. Try and complete at least twelve observations from the [challenge list](#). Completing the challenge will prove that you have achieved basic sky watcher skills, and earn you a certificate of completion when you email a copy of your observation notes to [stella@darkskyarkansas.org](mailto:stella@darkskyarkansas.org). There is no time limit on completing the observing challenge.

### FIRST NIGHT – The Night-Sky, what's up and how it moves.

- Perspective – sharing in the consciousness;
- Sky orientation and associated terminology;
- Anatomy of the sky to include constellations, asterisms, star names and magnitudes, etc.;
- Understanding the motions of the sky – stars, moon planets, comets, meteor showers, eclipses twilight;

Some Useful References:

- Learning the Constellations: available online when you register, but not required.
- [Stellarium: https://stellarium.org](https://stellarium.org)
- [Time and Date: https://www.timeanddate.com/](https://www.timeanddate.com/)
- [Satellites: www.heavens-above.com](http://www.heavens-above.com)
- Planetarium applications and programs - See the downloadable binocular guide for suggestions.
- Moon Phase Calendar:  
<https://www.moonconnection.com>, or get an app.

1<sup>st</sup> Week's suggested activities:

1. Locate the Ecliptic
  - a. Look up local sunset time [TimeandDate.com](https://www.timeanddate.com). Find a convenient location where you can note the approximate location on of sunset on the horizon.
  - b. Find the moon. Now you have two points along the ecliptic.



*Old Moon in New Moon's Arms*

- c. Use [Stellarium](#) or another planetarium program or app to find any of the naked eye planets that might be up. Mercury and Venus, if up, will not be far from the sun in the western sky, and along with the outer planets: Mars, Jupiter & Saturn, which may be anywhere along the ecliptic, if up, can be seen naked eye. Draw an imaginary arch from west to east from the sunset location, through the moon and any planets that are up and you will have laid out the ecliptic. Note that the planets don't twinkle and how bright they are compared to most stars. Also, note the colors of Mars, Jupiter and Saturn.
- d. While facing where the sun set, turn clockwise ninety degrees, or the use a compass or your cell phone to find North. Use your fist held at arm's length to estimate 10 degrees to estimate 35 degrees up from the northern horizon to find Polaris, a/k/a the "North Star" or "Pole Star". Verify it with the Big Dipper's pointer stars (the two stars that form the end of the dipper's cup). Polaris will be five times the distance between the pointer stars (see chart below).
- e. Trace out the Little Dipper, the handle of which ends with Polaris, and count the number of stars you can see. In skies with a lot of light you will probably see just three, but with a dark sky you should see all seven.
- f. Use the adjoining Circumpolar Chart to star-hop to Queen Cassiopeia, and any other constellations shown, that are high enough to see. (Remember that while the pattern of the stars shown in the chart doesn't change, the orientation does from season to season and over the night as the sky rotates, so you will have to turn the chart in your mind to line things up.)
- g. Find the bright (named) stars in the evening sky that form the seasonal asterism shown on the end chart below most appropriate to the season. Note the color of each such star in your observing notes. Try to observe them and record them on more than one evening, and commit them to memory.
- h. Optional Challenge: In the evening sketch the big dipper in relation to Polaris and the horizon, then before dawn wake up and resketch the dipper and Polaris again, or if that hurts too much, use Stellarium to see what the dipper would look like if you had gotten up. ☺

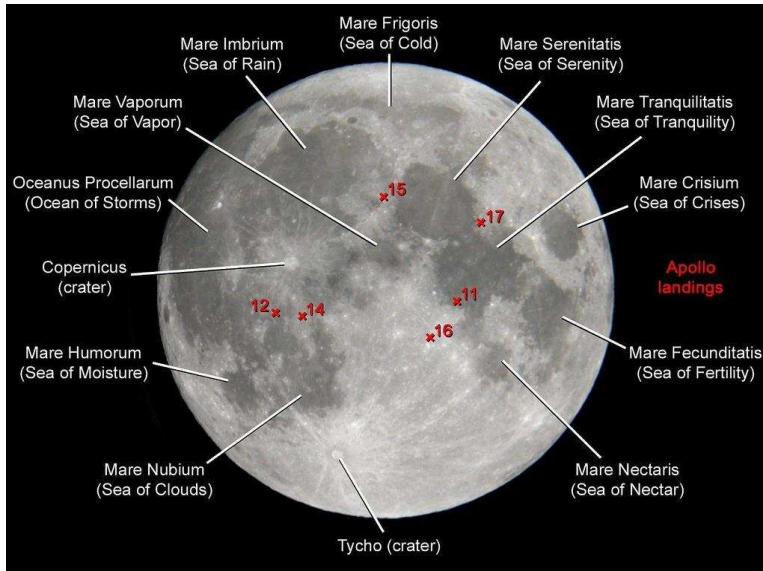


## SECOND NIGHT - Observing Basics, organizing and planning:

- Finding an observing site;
- The challenge of light pollution;
- Weather resources (clouds are bad);
- Sky conditions (transparency and seeing);
- Developing an observing program (AL models);
- Learning what's up (online charts and sky calendar resources);
- Preparing an observing kit;
- How to get and use charts;
- Star hopping..

### Some Useful References:

- Sky conditions and weather: <https://www.astrospheric.com>
- Finding dark-skies – <https://www.lightpollutionmap.info>
- SkyMap <http://skymaps.com> provides a simple downloadable and printable monthly sky map.
- Websites such as [In-The-Sky.org](http://In-The-Sky.org), [Sky and Telescope's sky-at-a-glance](http://Sky and Telescope's sky-at-a-glance), and [Astronomy's sky-this-week](http://Astronomy's sky-this-week), all provide information on what's up and happening in the sky.
- [The Globe-at-night: https://www.globeatnight.org](https://www.globeatnight.org)
- IDA's Sky Friendly Home: <https://idsw.darksky.org/activities/dark-sky-friendly-home/>



## 2nd Week Activities:

1. Put your observing kit together. Notepad, red flashlight, whatever charts or apps you intend to use.
2. Find a reasonably dark observing site.
3. As the moon will be progressing from Gibbous to Full:
  - a. Find the “Lady in the Moon”
  - b. Note the dark and light areas of the moon. Other than meteor strikes there is nothing to alter the lunar surface, no wind, no rain, no plate tectonics, so everything you see is very old. The dark areas “maria” (seas) are lava filled lowlands that occurred nearly four billions years ago. The rough “highland” areas are from meteor impacts, mostly from the late great bombardment, are even older.
4. Find Polaris and Cassiopeia, the squashed W or M shown on the Circumpolar Chart and any other constellation high enough to be seen.
5. Find the Seasonal asterism again and review the principle names stars. Enter them in your log to help remember them. Note how few stars you can see when the moon is full.

Look for bright white areas and rays. These are the youngest craters and ejecta from more recent impacts. If you have binoculars view these features using them.

- c. When the moon is full find the “Rabbit on the moon”, and the “lady on the moon”.

## THIRD NIGHT – Observing with binocular and small telescopes and Night Sky stewardship

- Selecting and using binoculars.
- The Cosmic Zoo – the types of objects we can see with binoculars and small scopes.
- Selecting an Observing program.
- impacts of light pollution, how to prevent it and certify your home as night sky compatible
- Globe-at-night and how to use it to learn the constellations, their mythology and to determine how dark your observing site is and report it as a citizen scientist.

Some Useful References:

- Arkansas Natural Sky Asso. [Library Telescope Object to View page.](#)
- [Dark-Sky Friendly Home Certification - IDA](#)
- [Globe-at-Night](#)

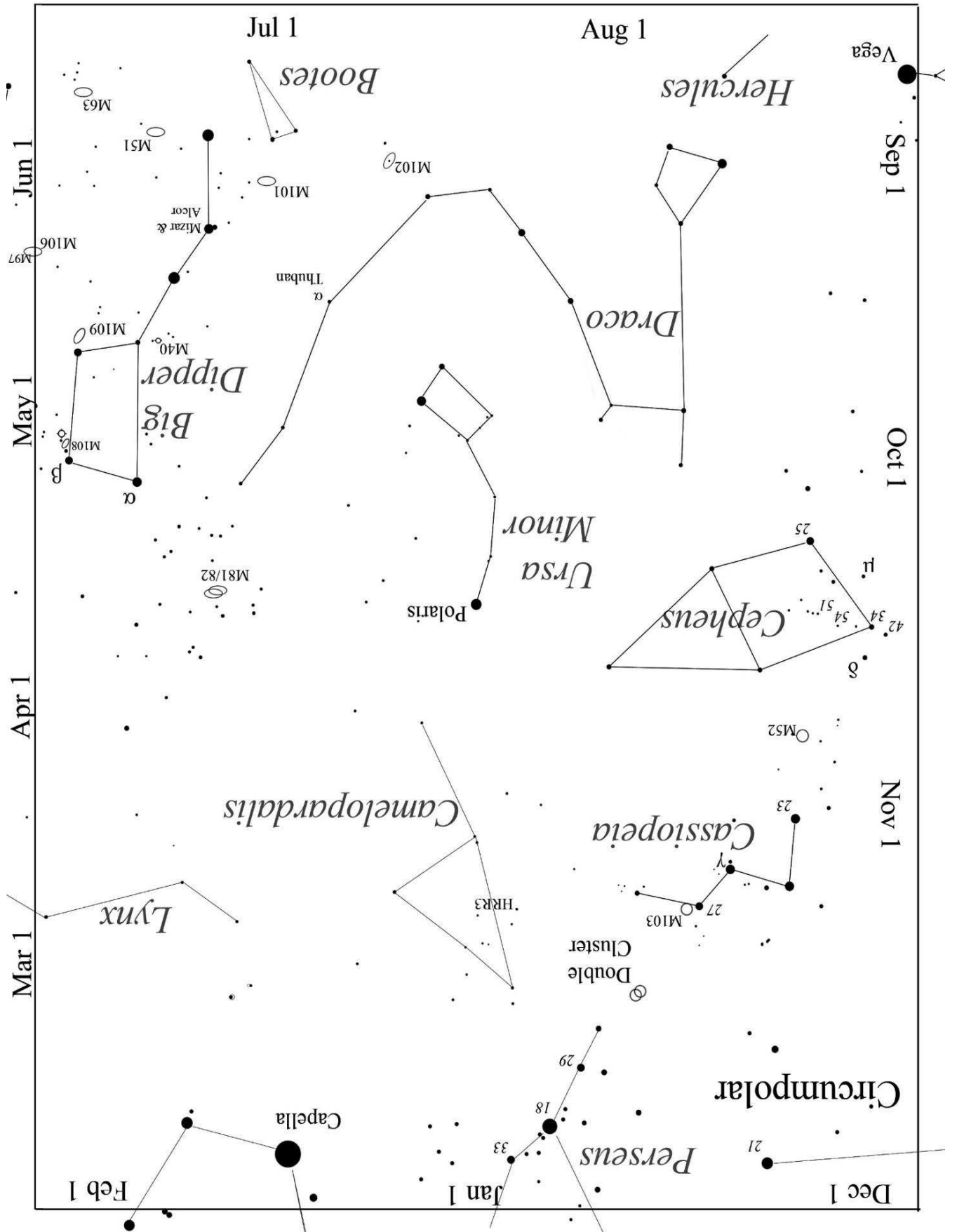


*The Double Cluster, Chris Lasley*

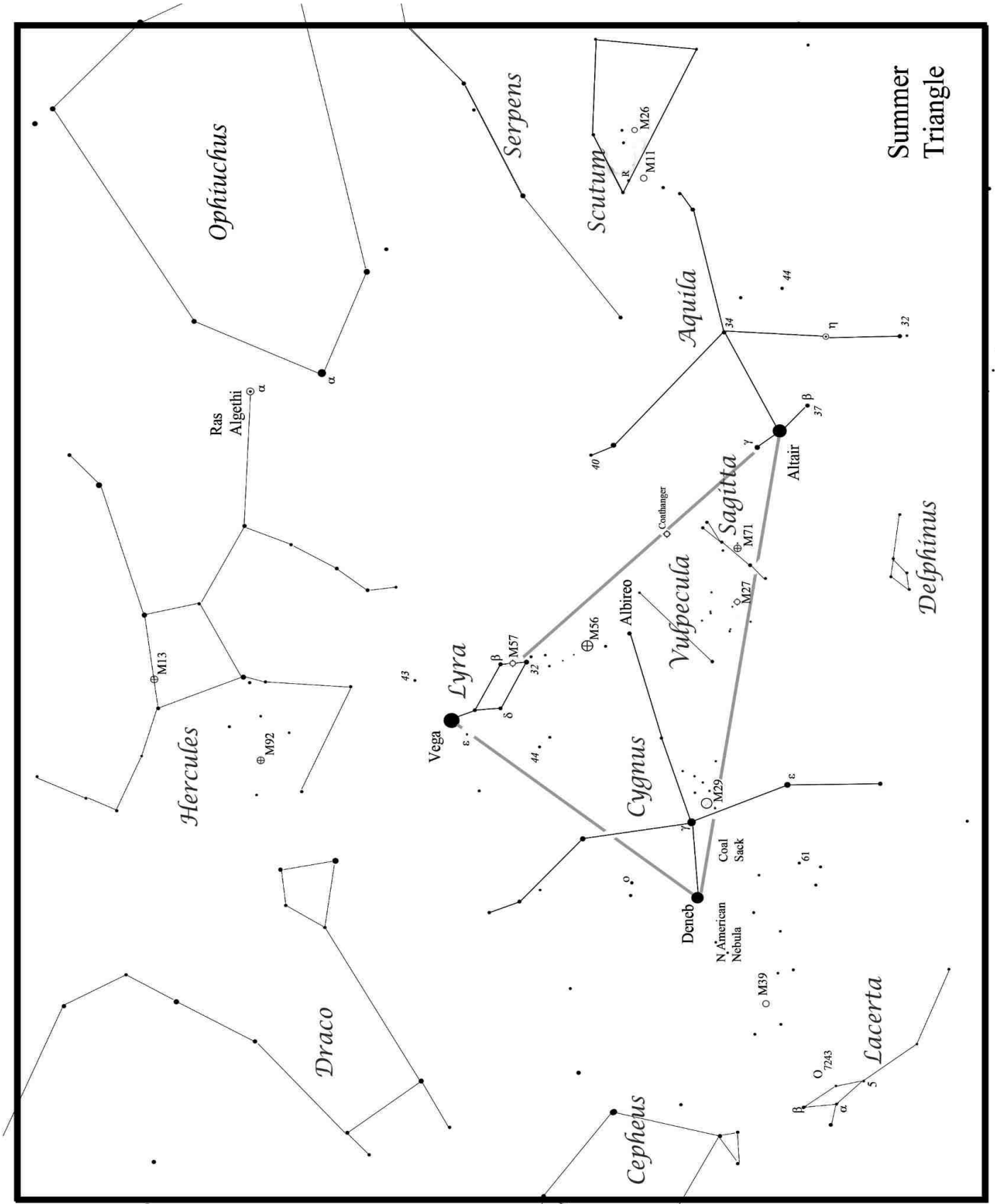
## 3rd Week Activities:

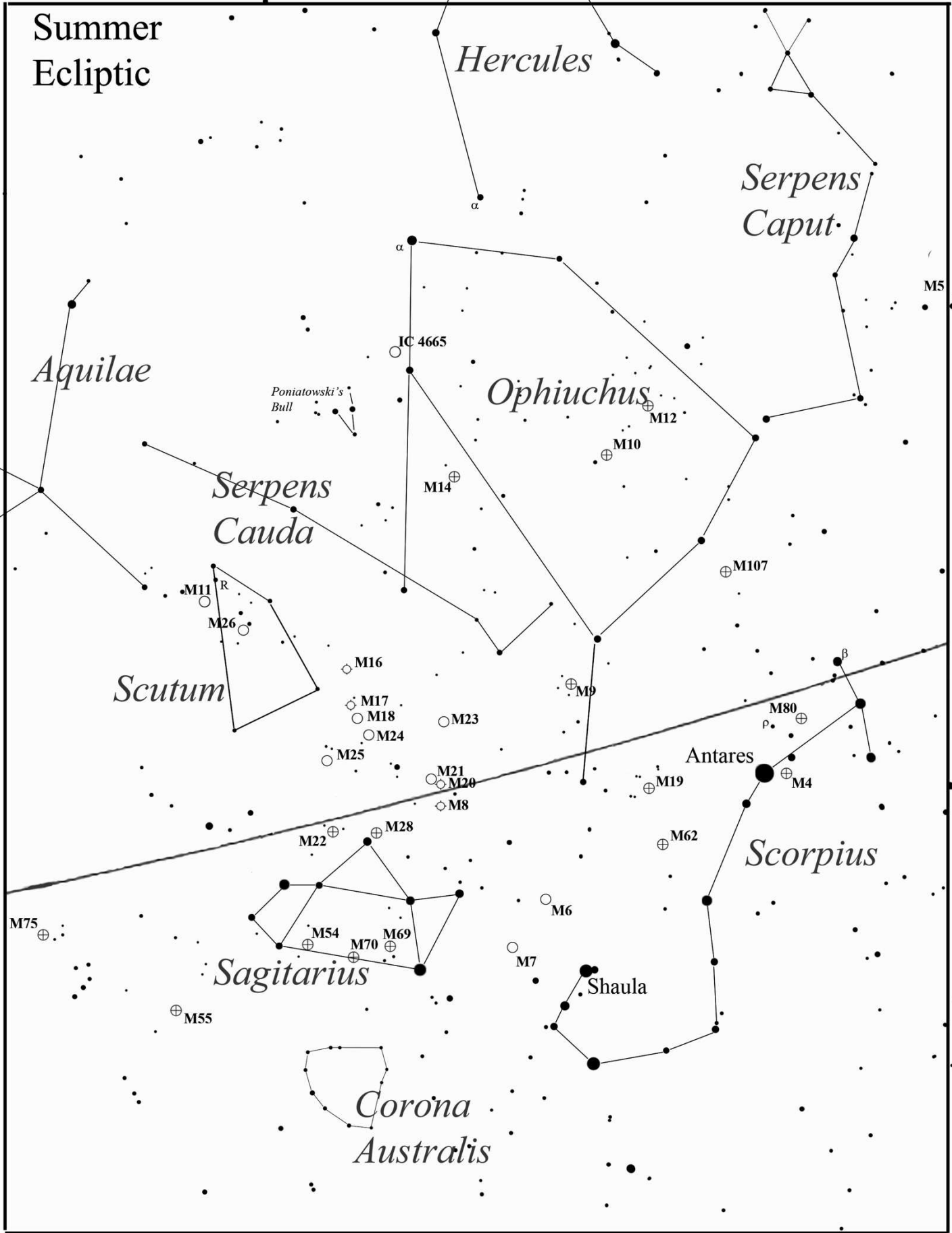
- Catch up on any of the activities that you missed above and then complete as many of the items on the challenge list as you can. Try to do at least twelve. In fact, take you time and finish them all.
- Use Globe at Night to determine and report how dark your favorite observing site is and use the link above to certify your home as Dark-Sky Friendly.

# Circumpolar Region

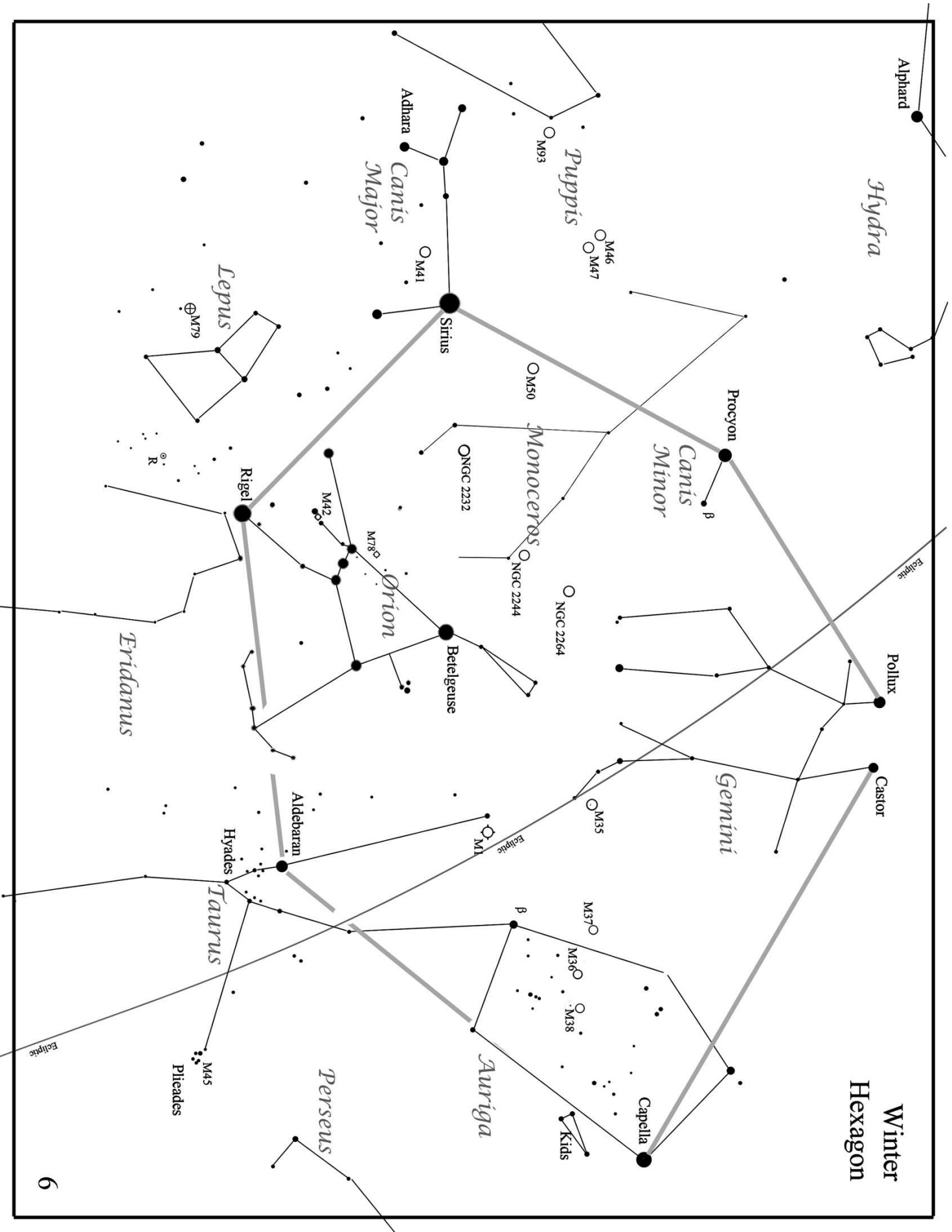


# Seasonal Asterism Charts





Winter  
Hexagon



Alphard

Hydra

Puppis

Canis Major

Lepus

Eridanus

Pollux

Canis Minor

Monoceros

Orion

Betelgeuse

Gemini

Castor

Aldebaran

Taurus

Perseus

Auriga

Capella

Pleiades

Winter  
Hexagon