

Night-Sky Observing 101 – Naked Eye and Binoculars

THE SCHEME – The moon dominates the nightly stage when she is up. Our program is planned around her cycle. We schedule each series to begin a few days after new moon. See our [Facebook Page](#) for the starting date and time of upcoming Obs. 101 programs. Subsequent installments of each series follow weekly at the **same time and day of the week** for three more weeks, four sessions in all.

Each night's program is briefly outlined below, along with some useful references to explore, and a recommended list of observing activities to perform to solidify what you learn. The first weeks activities don't require the darkest sky, but you should find a place that is removed from the brightest lights and try to do them before the moon gets too large.

After the second night the moon will be gibbous so the activities focus on lunar explorations, and preparing for darker skies to come.

By the third night we will be entering a period of moonless evenings, which will last through and past the fourth night. For this period you will want to find a reasonably dark-sky and have your observing kit together if you want to take full advantage of the observing challenge. Helping you find a site is part of the course. The optional challenge is to complete at least twelve observations from the challenge list available for download and earn your certificate of completion.

There is no time limit on completing the observing challenge. This is for fun, but also for the satisfaction of having learned something worth sharing. Completing the challenge will prove that you have achieved basic sky watcher skills.

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

- Perspective – why we observe;
- Sky orientation and associated terminology;
- Understanding the motions of the sky – stars, moon planets, comets, meteor showers, eclipses twilight;
- Anatomy of the sky to include constellations, asterisms, star names and magnitudes, etc.;
- The Cosmic Zoo – the types of objects we can see naked eye and with binoculars.

Some Useful References:

- Learning the Constellations: available online when you register.
- [Stellarium](https://stellarium.org): <https://stellarium.org>
- [Time and Date](https://www.timeanddate.com/): <https://www.timeanddate.com/>
- [Satellites](http://www.heavens-above.com): 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.

1st Week's activities:

1. Locate the Ecliptic
 - a. Look up local sunset time on [TimeandDate.com](https://www.timeanddate.com/). Find a convenient location where you can observe where the sun sets and establish an approximate point.
 - b. Find the moon. Now you have two points in the West for the ecliptic.
 - 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, and Mars, Jupiter or Saturn. All these can be seen naked eye



Old Moon in New Moon's Arms

when up. Draw an imaginary arch from the sunset location, through the moon and any planets and you will have laid out the ecliptic.

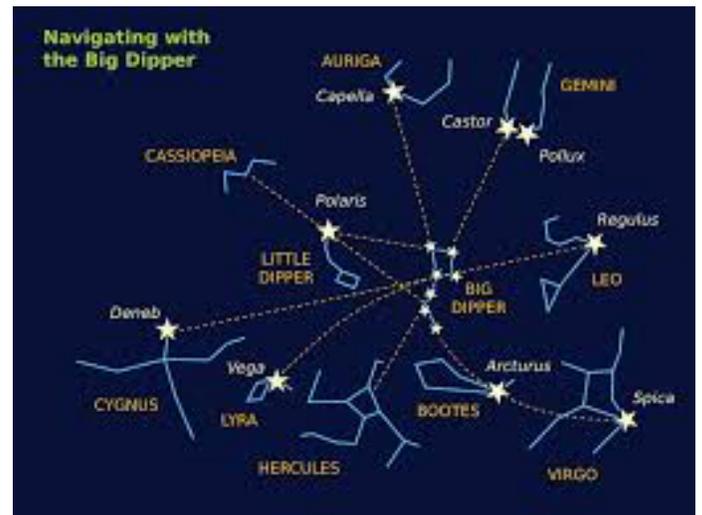
- d. Use a compass to find North and use what you have learned to estimate 35 degrees up from the horizon to find Polaris, if you can see it verify with the Big Dipper's pointer stars.
- e. Use the attached Circumpolar Chart to find Queen Cassiopeia and King Cepheus the Big Dipper; verify the north star using the 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.
- f. Count the stars you can see in the Little Dipper. Polaris is at the end of the handle. In skies with a lot of light you will probably see just 3, but with a dark sky all 7.
- g. Find the brightest stars in the evening sky. These stars are associated with the asterism shown on the "Seasonal Asterism Chart" below. Note the color of the stars and record the names of the brightest stars and the name of the asterism in your observing notes and attempt to commit them to memory. Try to observe them and record them on more than one evening.
- 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.

SECOND NIGHT - Observing Basics:

- Observing naked eye, and with binoculars
- 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);
- An observing kit (flashlight, clothes, bug spray, lounge chair, etc.);
- How to get and use charts;
- Star hopping.

Some Useful References:

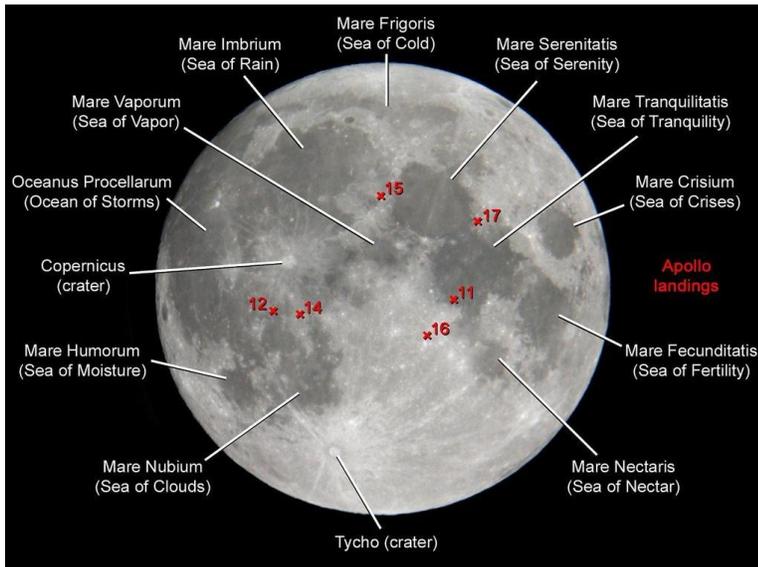
- Sky conditions and weather: <https://www.astrospheric.com>
- Finding dark-skies - <https://www.lightpollutionmap.info>
- SkyMap <http://skymaps.com> provides a simple downloadable and printable monthly sky map.
- Websites such as In-The-Sky.org, Sky and Telescope's sky-at-a-glance, and Astronomy's sky-this-week, all provide information on what's up and happening in the sky.



Star Hopping – using a set of stars to find other star groups

2nd Week Activities:

1. Put your observing kit together. Notepad, red flashlight, whatever charts or apps you intend to use. Think about where you might find a dark-sky observing site.
2. The moon will be progressing from Gibbous to Full.
 - a. Find the "Lady in the Moon"
 - b. Note the dark and light areas. 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. Look for bright white areas and rays. These are the youngest craters and ejecta from more recent impacts.

- c. When the moon is full find the “Rabbit on the moon”, and the “lady on the moon”.
3. Find Polaris and Cassiopeia, the squashed W or M shown on the Circumpolar Chart.
4. Find the Seasonal asterism again and the principle stars. Enter them in your log to help remember them. Note how few stars you can see when the moon is full.

THIRD NIGHT – Judging and protecting dark skies

This is a far more interesting and informative segment than you might imagine. Besides learning some surprising things about the impacts of light pollution, other than hiding the stars, we will review the website [Globe-at-night](https://www.globeatnight.org) and how to use it to learn the constellations, their mythology and to determine how dark your observing site is and how to report that information as a citizen scientist. We will also take a few minutes to walk through how you can evaluate your home lighting and download a responsible home lighting certification. Finally, we will talk about the upcoming dark-sky period and answer questions.

Some Useful References:

- [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/>

3rd Week Activities:

- Using Globe-at-night determine how dark you chosen observing site sky is and record the results online.
- 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.

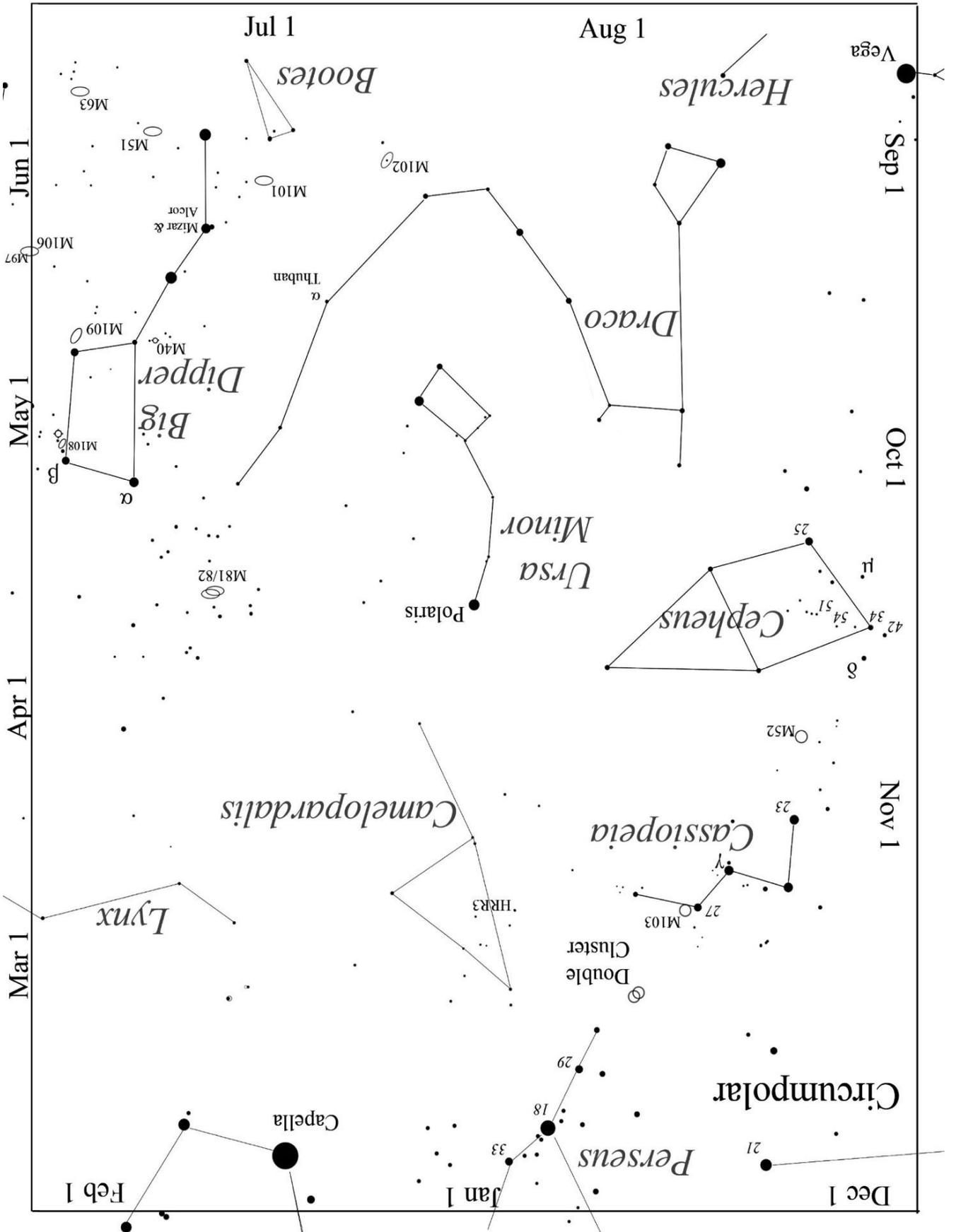
FOURTH NIGHT – Virtual Star Party

On the fourth night we will have a virtual star party. We wish we could hold the real thing, but we will get as close as we can using images and charts. We will also review the constellations and larger star fields and other objects that are currently in the sky. Some telescopic, others that you may be attempting to find and observe with the eye or binoculars. Learning more about them makes finding them more rewarding.



The Double Cluster, Chris Lasley

Circumpolar Region



Seasonal Asterism Chart

