An Introduction to the Night Skies
Week 3

Presented by:
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and Members of RASC Sunshine Coast Centre

HOW DO WE FIND OBJECTS IN THE NIGHT SKY?

Some of the Feedback from Class 1

- How can I find particular objects in the sky?
- How can I explore the sky with my grandkids?
- Which stars are which?
- Most class members do not own telescopes but they do own binoculars.
- So our focus will be on naked eye and binocular astronomy.

First steps – learning the sky

- Take any opportunity to look up, even when the moon is out
- If you have binoculars use them. they will make faint stars and objects more visible.
- Consider using a smart-phone App or Planetarium software on a computer.*
- Join an astronomy club, like ours!!

(* Class 4)

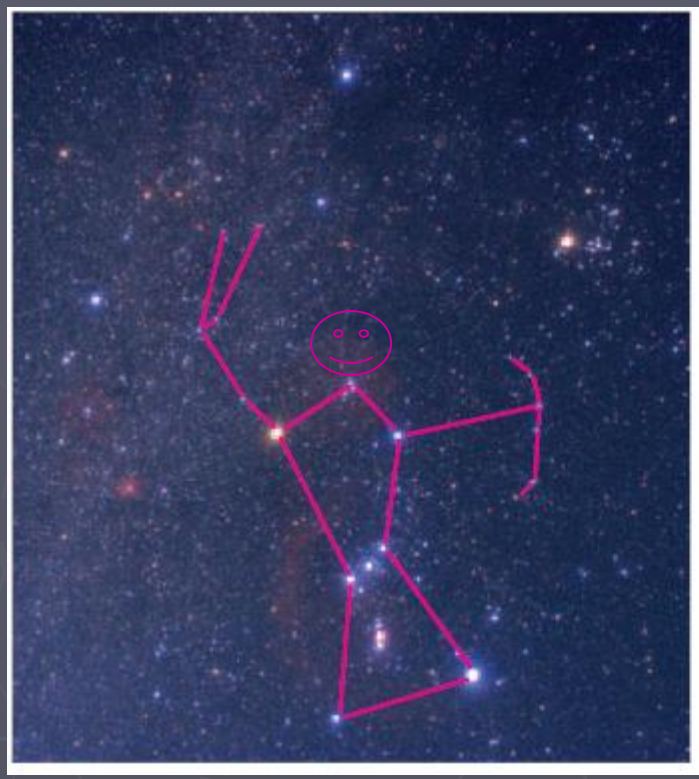
Sky maps

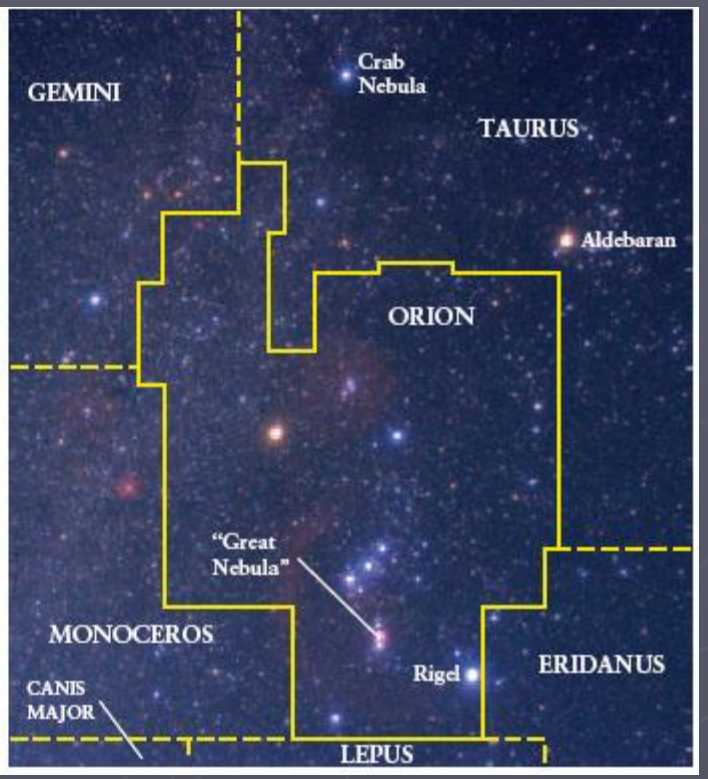
- Use the Star Finder distributed in Class 1. It is quite accurate for our BC latitude, not so good in Florida!
- Monthly astronomy magazines have charts of the sky for each month and most have special sections for binocular observers. These magazines are available at the usual places, including the libraries.
- The course web site includes a link to “Sky Maps” where you can download a free monthly chart. It also provides suggestions of naked eye, bino and telescope objects to look for: http://www.skymaps.com/

The first step - Constellations

Exploring the heavens during winter

Constellations

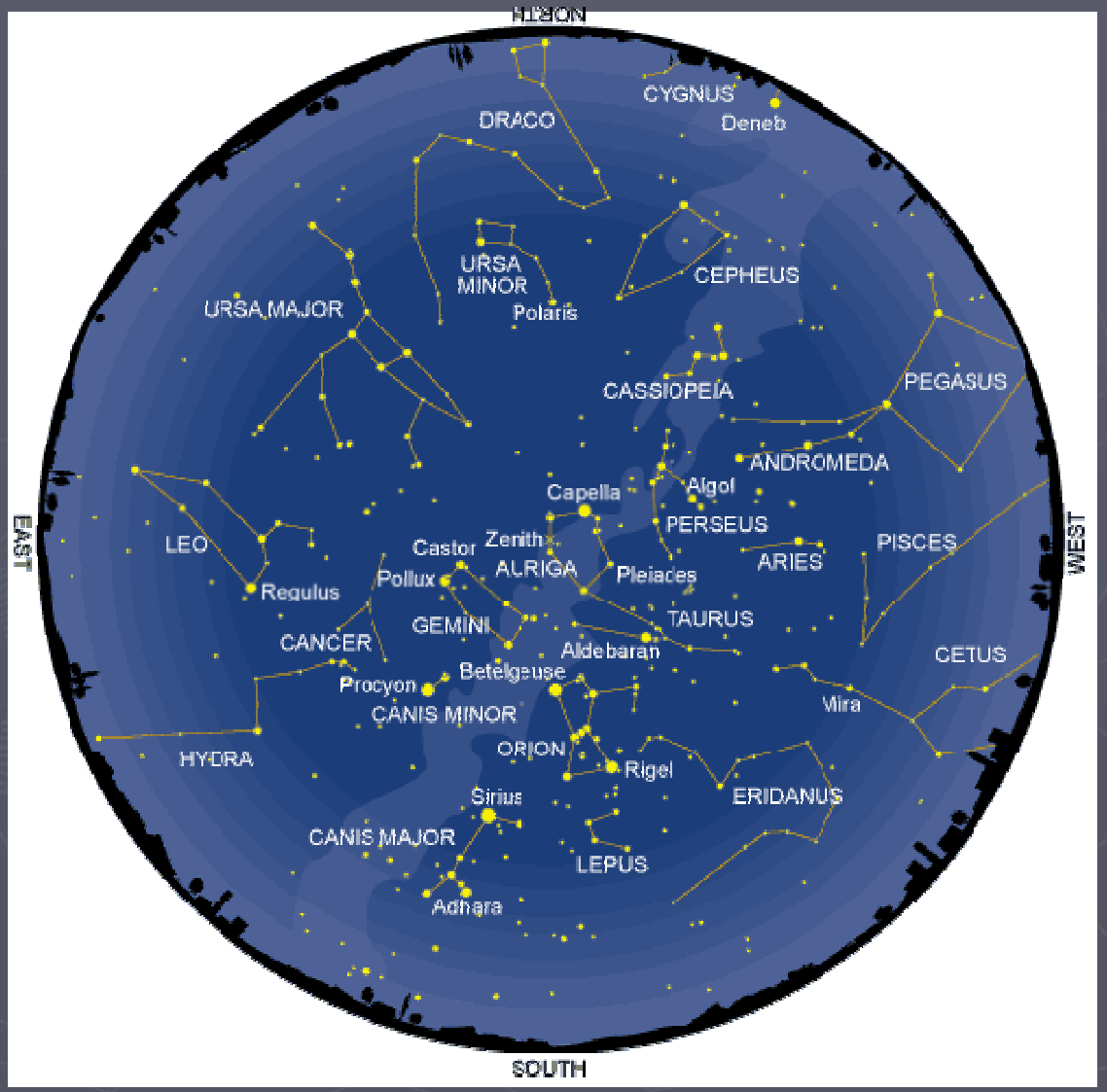




Ancient constellations were imaginary pictures outlined by familiar patterns of stars.

Modern astronomers divide the sky into 88 official constellations or regions of space, many of which contain the ancient star patterns.

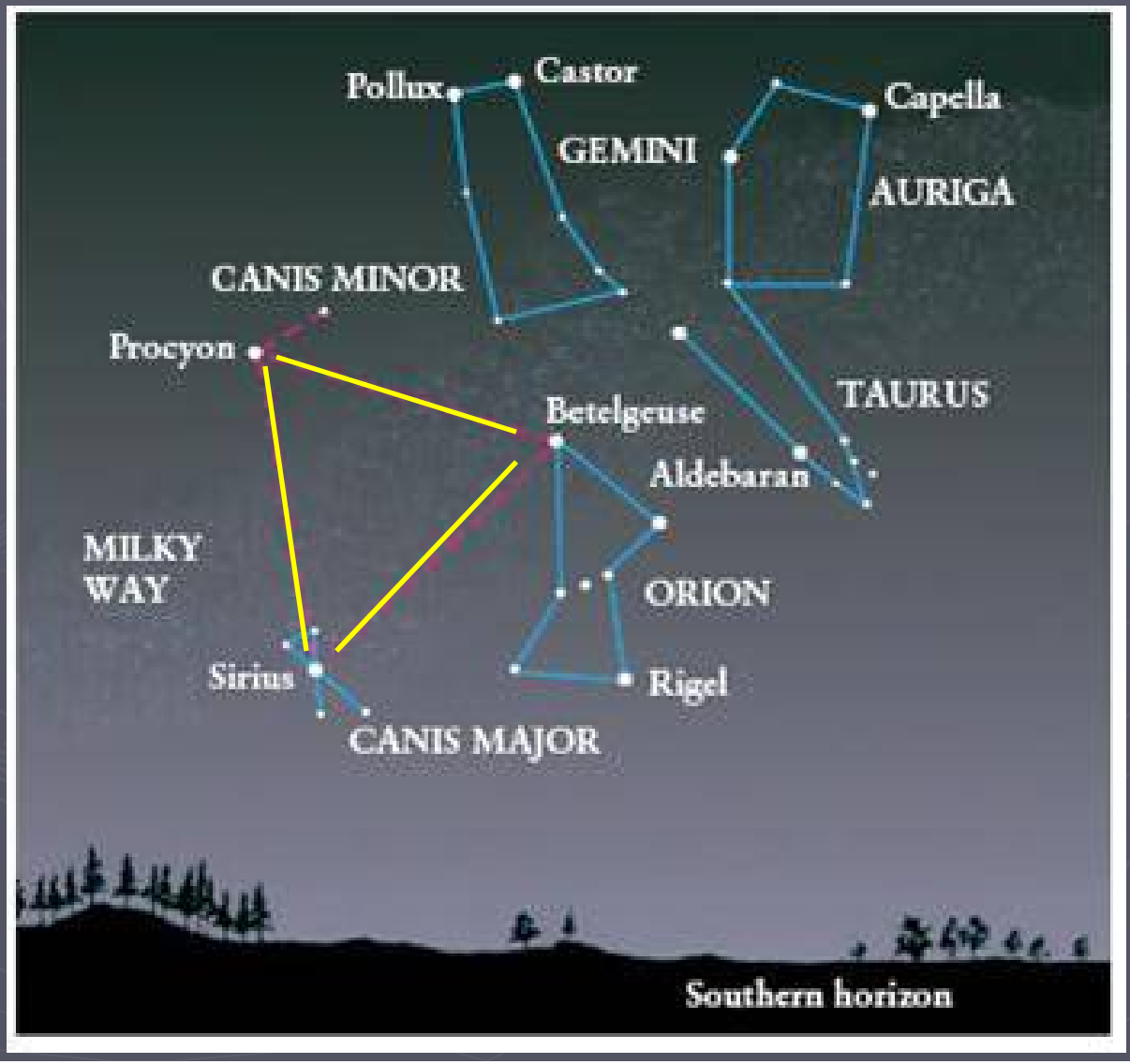
Winter Sky


NORTH
CYGNUS
Deneb
DRACO
URSA MINOR
Polaris
CEPHEUS
URSA MAJOR
CASSIOPEIA
PEGASUS
ANDROMEDA
Capella
Algol
PERSEUS
EAST
WEST
LEO
Castor
Zenith
ALRIGA
Pleiades
ARIES
PISCES
Regulus
Pollux
GEMINI
TAURUS
CANCER
Aldebaran
CETUS
Procyon
Betelgeuse
CANIS MINOR
Mira
HYDRA
ORION
Rigel
Sirius
ERIDANUS
CANIS MAJOR
LEPUS
Adhara
SOUTH

Winter Sky

- The winter sky offers stargazers many beautiful and prominent constellations, with deep sky objects that you can really enjoy.
- Winter represents some of the best viewing of the year. This is because the smog and haze that mask the heavens give way to crystal-clear nights, and the night darkness comes much earlier which is essential when observing.
- We will consider a few of the most prominent and spectacular sights that the winter skies have to offer.
- But first let’s find the “Winter Triangle”

The “Winter Triangle”



ORION

According to one legend, Orion was the mightiest hunter of all time. One day, he boasted of being able to defeat any animal on earth. His constant bragging was overheard by Mother Earth, who, fearing that he would destroy every creature, sent a poisonous scorpion to sting Orion on the heel and kill him. But Diana, goddess of the hunt, felt sorry for Orion. To honor him, she placed Orion among the stars.

Orion is a study all by itself!

Look for three equally bright stars in a row, which forms Orion's belt. To the north lies the bright reddish star of **Betelgeuse** — the left shoulder. His right shoulder is represented by the star **Bellatrix**. Below the belt are the stars **Rigel**, and **Saiph** representing his knees.

Hanging from the belt of Orion are the dim stars of his sword. The middle star in the sword is not actually a star at all, but a cloud of glowing hydrogen gas called a **nebula.** It is known as the **Great Orion Nebula**.

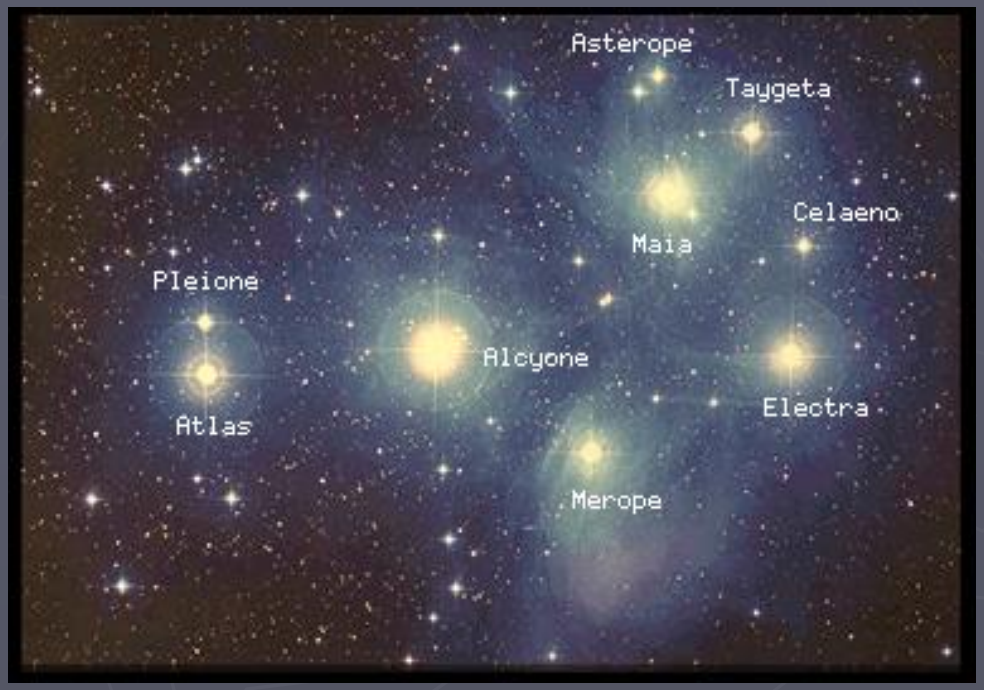
Nearby we have Taurus the Bull

To find Taurus, draw a line through Orion's belt and extend it to the upper right. You will come to the bright orange star **Aldebaran**, this is eye of the Bull.

The head of Taurus is formed by a V-shape group of stars nicknamed the **Hyades**. Imaginary lines extend to two stars above its head to create Taurus's long horns.

The Pleiades

The Hunter is doing battle again, this time trying to club Taurus the Bull.

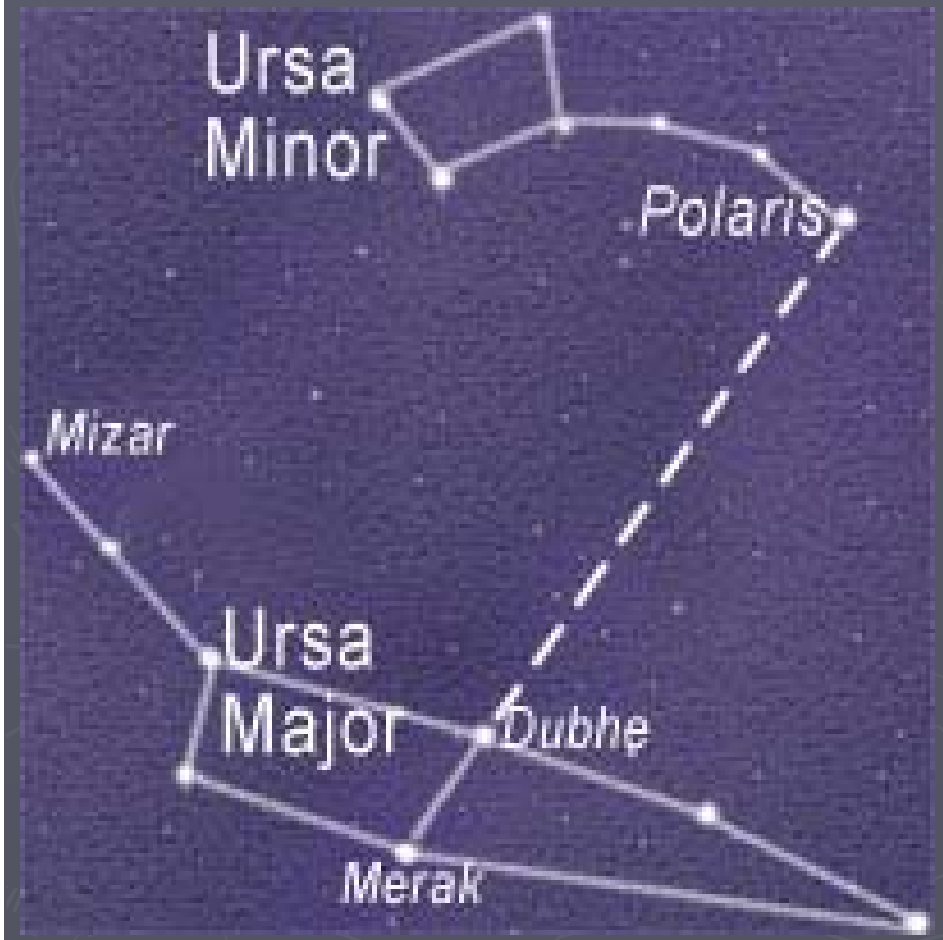


The story goes that Orion is trying to to save seven sisters who were kidnapped by Taurus. We can still see the sisters trapped in the sky, formed by the small cluster of stars known as the **Pleiades.**

Ursa Major and Minor

In Roman mythology, Jupiter lusts after a young woman named Calisto. Juno, Jupiter' jealous wife, transforms the beautiful Callisto into a bear. Callisto, the bear later encounters her son Arcas. He almost shoots the bear, but to avert the tragedy, Jupiter turns them both into bears and puts them in the sky, forming Ursa Major and Ursa Minor. The king of gods then placed both mother and son into the heavens as neighboring constellations. so the two constellations never dip below the horizon.

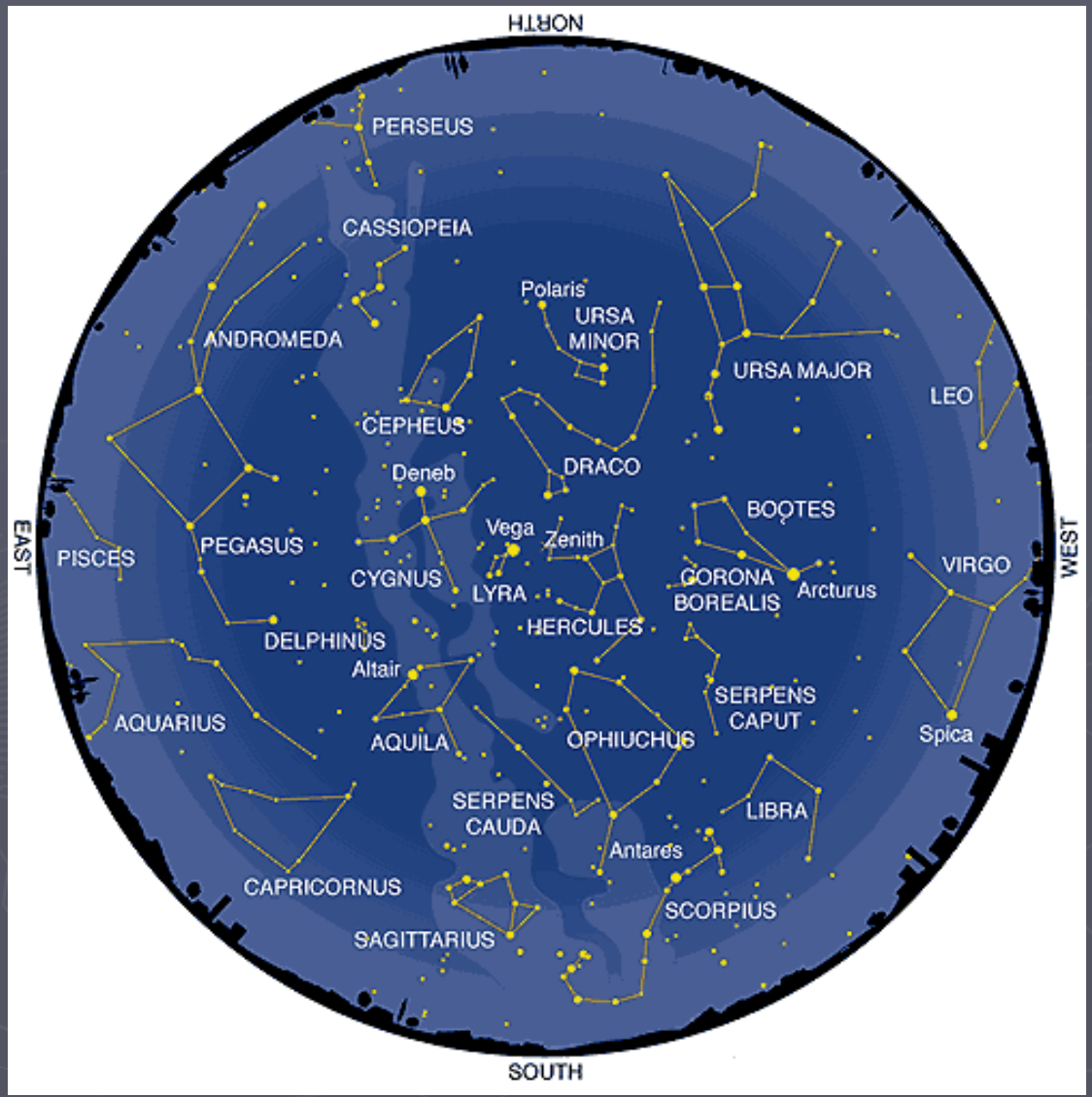
Finding Polaris



By drawing a line from the stars Merak and Dubhe (the end of the Dippers' bowl) and extending it to the north, you will come to Polaris, the North Star. The last star in the little dipper.

Despite popular belief, Polaris is not the brightest star in the sky, but it is special because Polaris is apparently motionless from the Earth, and all the stars of the Northern sky appear to rotate around it.

Summer Sky


NORTH
EAST
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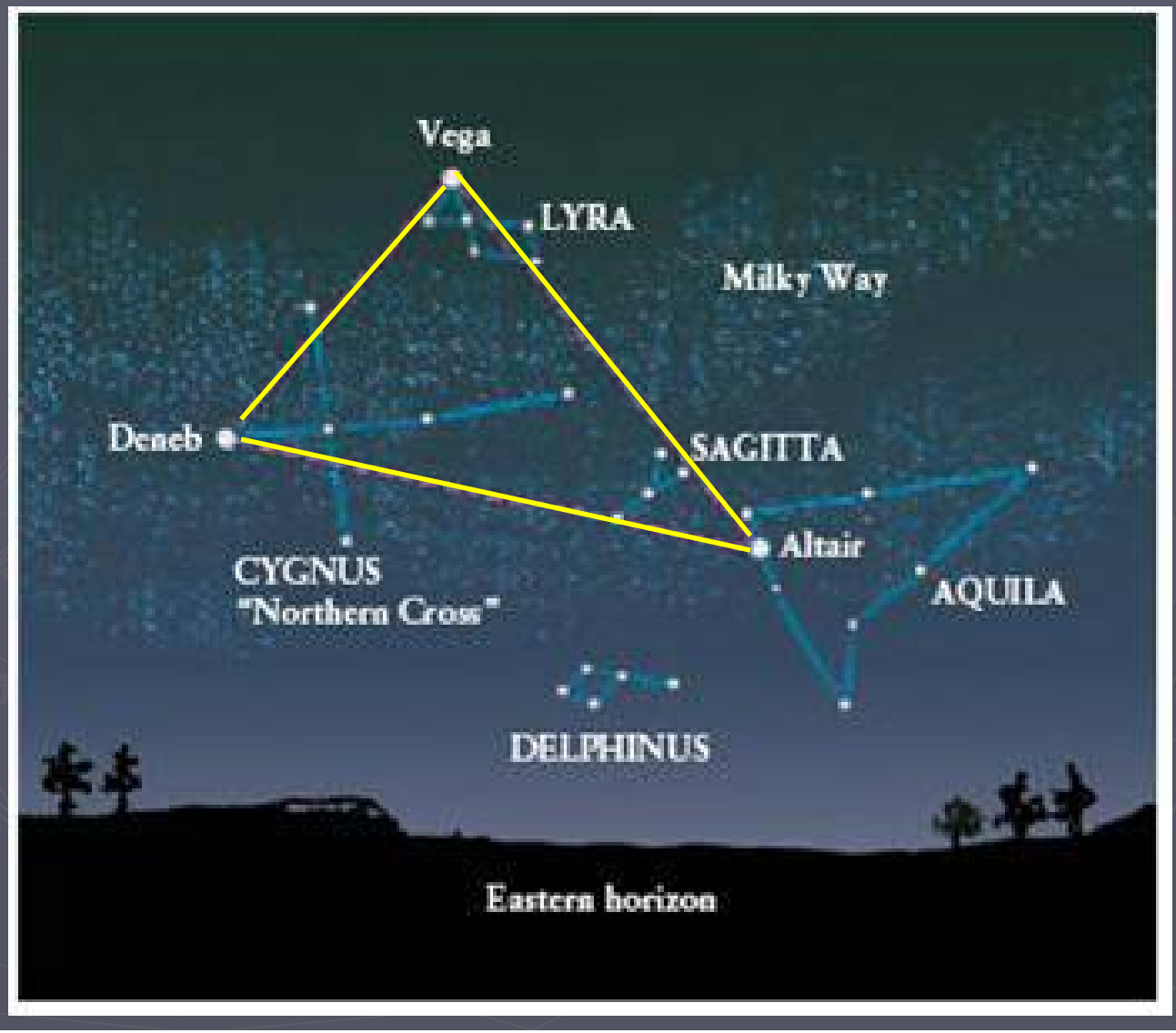
SOUTH
PERSEUS
CASSIOPEIA
Polaris
URSA MINOR
ANDROMEDA
URSA MAJOR
LEO
CEPHEUS
DRACO
Deneb
BOOTES
Vega
Zenith
PISCES
PEGASUS
CYGNUS
LYRA
CORONA BOREALIS
Arcturus
VIRGO
HERCULES
DELPHINUS
Altair
SERPENS CAPUT
AQUARIUS
AQUILA
OPHIUCHUS
Spica
SERPENS CAUDA
LIBRA
Antares
CAPRICORNUS
SCORPIUS
SAGITTARIUS

The “Summer Triangle”




Jupiter

Observed since Ancient times

One of the brightest objects in the nights sky, Jupiter has been observed since ancient times and was connected to the religious beliefs and mythologies of many cultures.

At this time of year it is high in our sky.

The Romans named Jupiter after the king of their gods.

Jupiter appears like a bright star above the marbled streets of the ancient Greek city of Ephesus, located in modern day Turkey.

http://www.twanight.org/newTWAN/index.asp

The Naked eye planets

Naked eye planets:

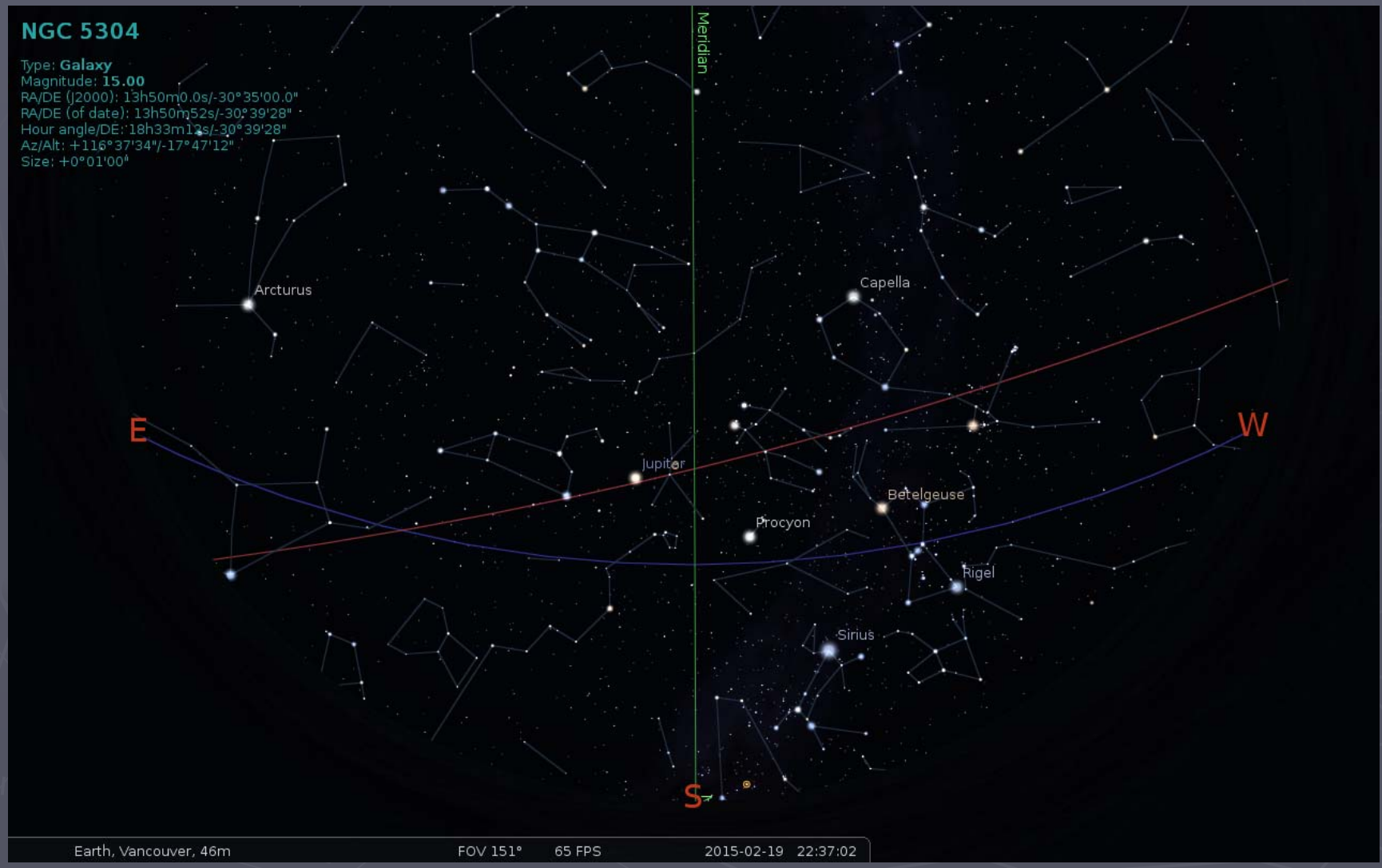
Mercury, Venus, Mars, Jupiter, Saturn.

All planets appears to move against the background stars from night to night.

In fact, the word “planet” comes from the ancient Greek word for “wanderer.”

Credit: Johan Meuris/Stellarium

Jupiter this evening, facing South



USING SKY MAPS

Using Sky Maps

- Note that all times on this chart are stated in Universal Time (UTC).
- It is equivalent to the Greenwich Mean Time (GMT)
- UTC is the time standard commonly used across the world. The world's timing centers have agreed to keep their time scales closely synchronized - or coordinated - therefore the name Coordinated Universal Time.

Sky Maps – February 2015

19 **Moon at perigee** (closest to Earth) at 7h UT (356,995 km; angular size 33.5').

21 **Moon, Venus and Mars** within circle diameter 2.0° (28° from Sun, evening sky) at 0h UT. Mags. -4.0 and +1.3.

21 **Moon very near Uranus** (41° from Sun, evening sky) at 22h UT. Mag. +5.9. Occultation visible from southeast Canada and northeast USA

22 **Venus 0.4° SSE of Mars** (28° from Sun, evening sky) at 6h UT. Mags. -4.0 and +1.3.

24 **Mercury at greatest elongation**, 27° west of Sun (morning sky) at 16h UT. Mag +0.1.

25 **First Quarter Moon** at 17:14 UT.

25 **Moon very near Aldebaran** (evening sky) at 23h UT.

The Zodiacal Light is caused by sunlight reflected off meteoric dust in the plane of the solar system. Choose a clear, moonless night, about 1-2 hours after sunset, and look for a large triangular-shaped glow extending up from the horizon (along the ecliptic). The best months to view the Zodiacal Light is when the ecliptic is almost vertical at the horizon: March and April (evening) and October-November (morning).

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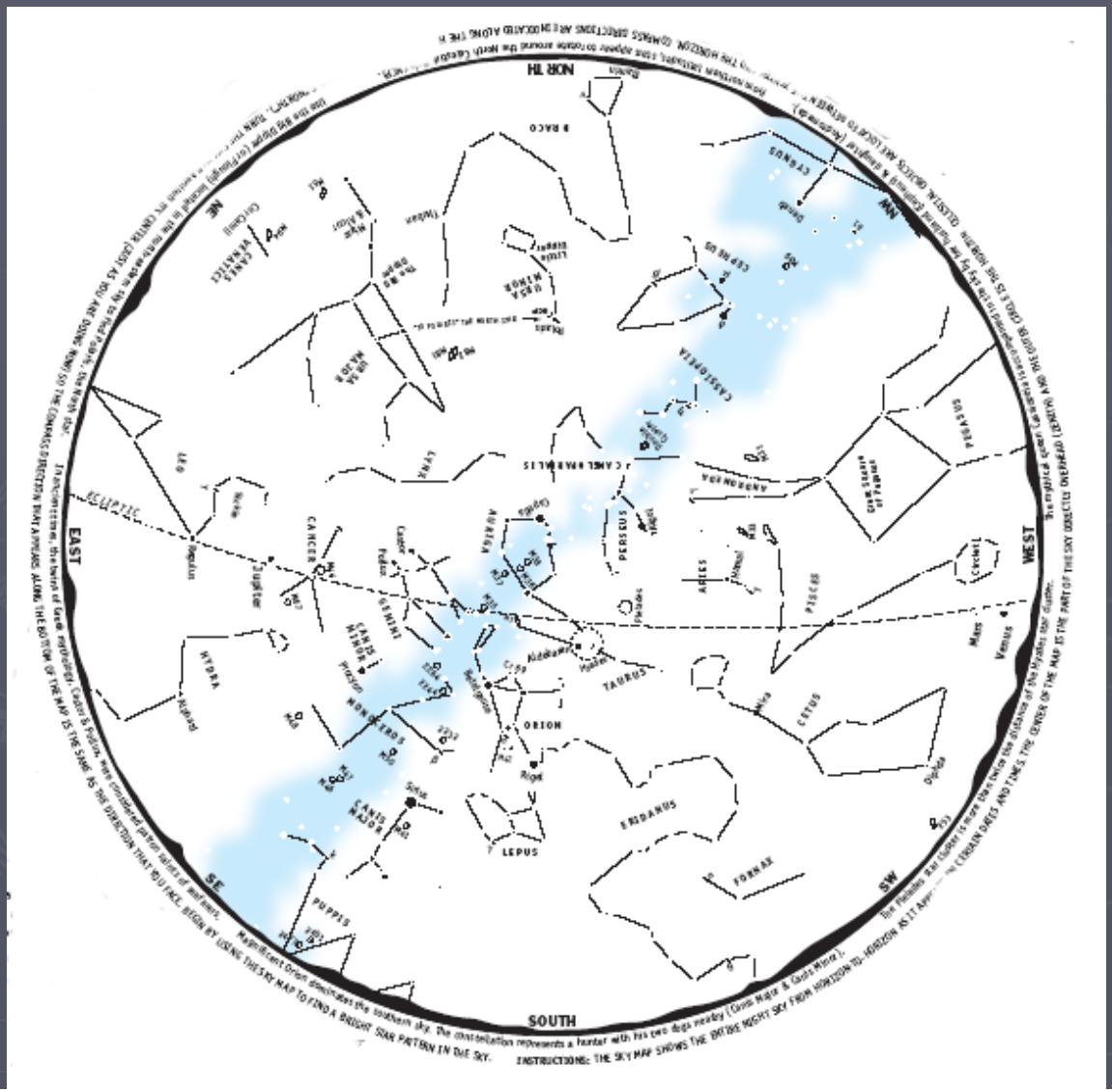
February 20th, Waxing Crescent Moon, Mars, Venus

Sky Map - February



February Naked eye objects

Capella	Aur	●	The 6th brightest star. Appears yellowish in color. Spectroscopic binary. Dist=42 ly.
Sirius	CMa	●	The brightest star in the sky. Also known as the "Dog Star". Dist=8.6 ly.
Procyon	CMi	●	Greek name meaning "before the dog" - rises before Sirius (northern latitudes). Dist=11.4 ly.
δ Cephei	Cep	◉	Cepheid prototype. Mag varies between 3.5 & 4.4 over 5.366 days. Mag 6 companion.
Deneb	Cyg	●	Brightest star in Cygnus. One of the greatest known supergiants. Dist=3,000 ly.
Castor	Gem	●	Multiple star system with 6 components. 3 stars visible in telescope. Dist=52 ly.
Pollux	Gem	●	With Castor, the twin sons of Leda in classical mythology. Dist=34 ly.
Regulus	Leo	●	Brightest star in Leo. A blue-white star with at least 1 companion. Dist=77 ly.
Rigel	Ori	●	The brightest star in Orion. Blue supergiant star with mag 7 companion. Dist=770 ly.
Betelgeuse	Ori	●	One of the largest red supergiant stars known. Diameter=300 times that of Sun. Dist=430 ly.
Algol	Per	◉	Famous eclipsing binary star. Magnitude varies between 2.1 & 3.4 over 2.867 days.
Pleiades	Tau	◌	The Seven Sisters. Spectacular cluster. Many more stars visible in binoculars. Dist=380 ly.
Hyades	Tau	◌	Large V-shaped star cluster. Binoculars reveal many more stars. Dist=152 ly.
Aldebaran	Tau	●	Brightest star in Taurus. It is not associated with the Hyades star cluster. Dist=65 ly.
Polaris	UMi	●	The North Pole Star. A telescope reveals an unrelated mag 8 companion star. Dist=433 ly.

February Binocular objects

M31	And	⌀	The Andromeda Galaxy. Most distant object visible to naked eye. Dist=2.5 million ly.
M38	Aur	◌	Stars appear arranged in "pi" or cross shape. Dist=4,300 ly.
M36	Aur	◌	About half size of M38. Located in rich Milky Way star field. Dist=4,100 ly.
M37	Aur	◌	Very fine star cluster. Discovered by Messier in 1764. Dist=4,400 ly.
M44	Cnc	◌	Praesepe or Beehive Cluster. Visible to the naked eye. Dist=590±20 ly.
M41	CMa	◌	First recorded observation by Aristotle in 325 BC as "cloudy spot". Dist=2,300 ly.
μ Cephei	Cep	⊙	Herschel's Garnet Star. One of the reddest stars. Mag 3.4 to 5.1 over 730 days.
Mira	Cet	⊙	Famous long period variable star. Mag varies between 3.0 & 10.1 over 332 days.
M39	Cyg	◌	May be visible to the naked eye under good conditions. Dist=900 ly.
M35	Gem	◌	Fine open cluster located near foot of the twin Castor. Dist=2,800 ly.
M48	Hya	◌	12+ stars in 7x binoculars. Triangular asterism near centre. Dist=1,990 ly.
γ Leporis	Lep	●	Visible with binoculars. Gold & white stars. Mags 3.6 & 6.2. Dist=30 ly. Sep=96.3".
2232	Mon	◌	A large scattered star cluster of 20 stars. Dist=1,300 ly.
2244	Mon	◌	Surrounded by the rather faint Rosette Nebula. Dist=5,540 ly.
M50	Mon	◌	Visible with binoculars. Telescope reveals individual stars. Dist=3,000 ly.
Cr 69	Ori	◌	Lambda Orionis Cluster. Dist=1,630 ly.
M42	Ori	□	The Great Orion Nebula. Spectacular bright nebula. Best in telescope. Dist=1,300 light years.
Double Cluster	Per	◌	Double Cluster in Perseus. NGC 869 & 884. Excellent in binoculars. Dist=7,300 ly.
M47	Pup	◌	Bright star cluster. 15+ stars in 7x binoculars. Dist=1,500 ly.
M46	Pup	◌	Dist=5,400 ly. Contains planetary NGC 2438 (Mag 11, d=65") - not associated.

February Telescope objects

γ Andromedae	And	●	Attractive double star. Bright orange star with mag 5 blue companion. Sep=9.8".
γ Arietis	Ari	●	Impressive looking double blue-white star. Visible in a small telescope. Sep=7.8".
M67	Cnc	◌	Contains 500+ stars mag 10 & fainter. One of the oldest clusters. Dist=2,350 ly.
M94	CVn	⬭	Compact nearly face-on spiral galaxy. Dist=15 million ly.
M51	CVn	⬭	Whirlpool Galaxy. First recognised to have spiral structure. Dist=25 million ly.
η Cassiopeiae	Cas	●	Yellow star mag 3.4 & orange star mag 7.5. Dist=19 ly. Orbit=480 years. Sep=12".
61 Cygni	Cyg	●	Attractive double star. Mags 5.2 & 6.1 orange dwarfs. Dist=11.4 ly. Sep=28.4".
θ Eridani	Eri	●	Striking blue-white double star. Mags 3.2 & 4.3. Visible in a small telescope. Sep=8.2".
γ Leonis	Leo	●	Superb pair of golden-yellow giant stars. Mags 2.2 & 3.5. Orbit=600 years. Sep=4.4".
β Monocerotis	Mon	●	Triple star. Mags 4.6, 5.0 & 5.4. Requires telescope to view arc-shape. Sep=7.3".
2264	Mon	◌	Christmas Tree Cluster. Associated with the Cone Nebula. Dist=2,450 ly.
σ Orionis	Ori	●	Superb multiple star. 2 mag 7 stars one side, mag 9 star on other. Struve 761 triple in field.
k Puppis	Pup	●	Telescope easily shows two blue-white stars of almost equal brightness. Sep=9.9".
M1	Tau	□	Crab Nebula. Remnant from supernova which was visible in 1054. Dist=6,500 ly.
M33	Tri	⬭	Fine face-on spiral galaxy. Requires a large aperture telescope. Dist=2.3 million ly.
M81	UMa	⬭	Beautiful spiral galaxy visible with binoculars. Easy to see in a telescope.
M82	UMa	⬭	Close to M81 but much fainter and smaller.

Messier 44 – The “Beehive Cluster”

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- AKA “The Praesepe”, Latin for manger.
- An open cluster in the constellation Cancer. It is one of the nearest open clusters to the Solar System, and it contains a larger star population than most other nearby clusters.
- Under dark skies the Beehive Cluster looks like a nebulous object to the naked eye; thus it has been known since ancient times. It was among the first objects that Galileo studied with his telescope.

Wikipedia

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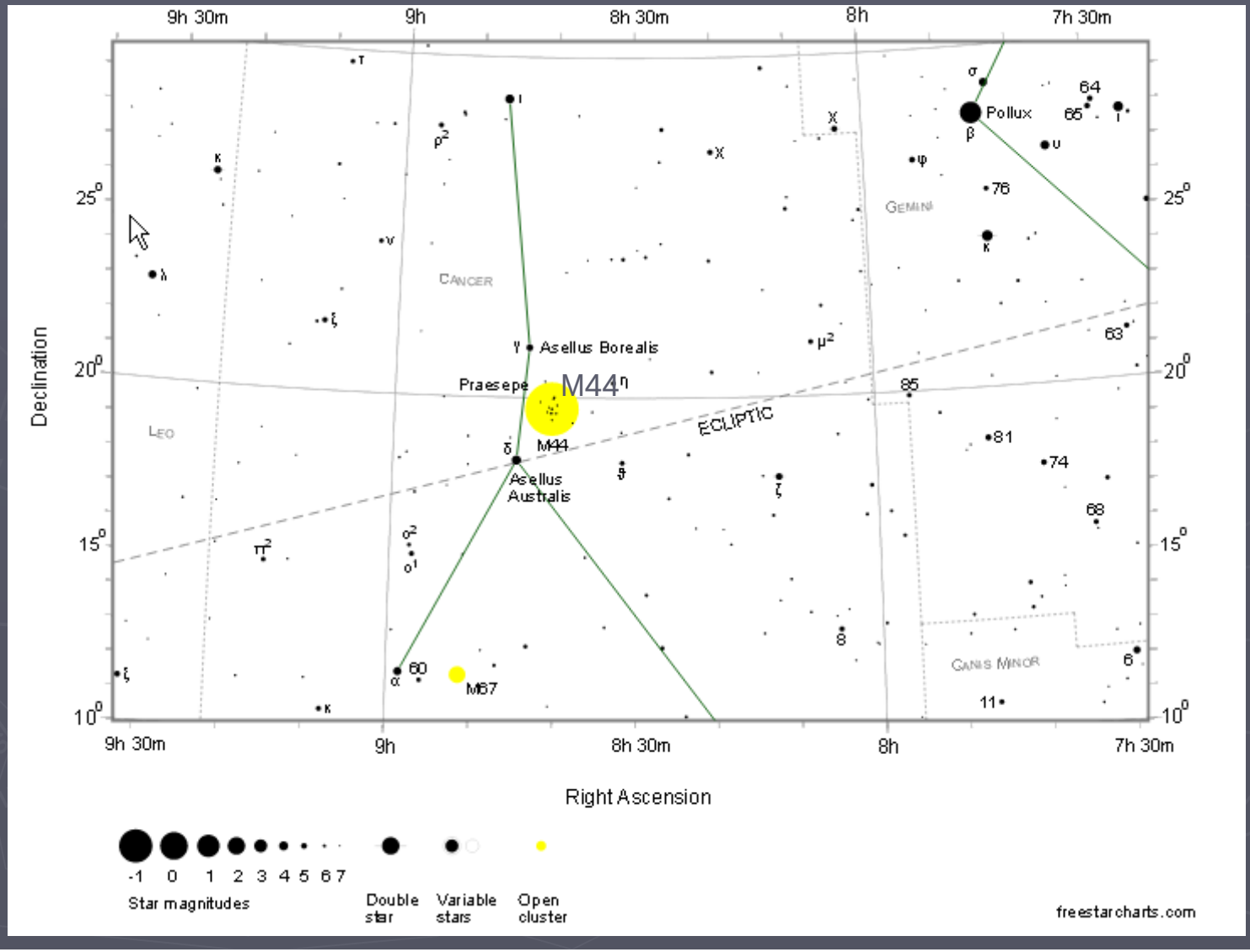

NGC869, NGC884 - “Double Cluster”

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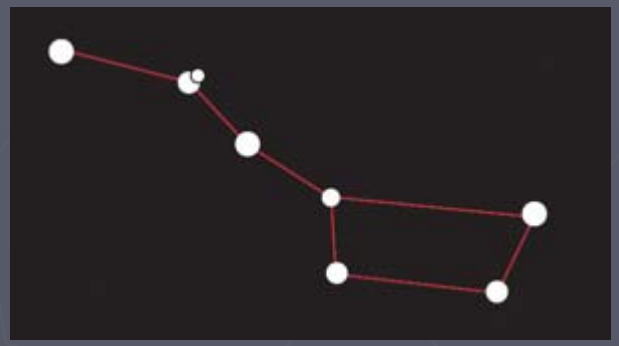
- The Double Cluster is the common name for the open clusters NGC 869 and NGC 884 which are close together in the constellation Perseus.
- They both lie at a distance of 7500 light years. NGC 869 has a mass of 3700 solar masses and NGC 884 weighs in at 2800 solar masses. There are more than 300 blue-white super-giant stars in each of the clusters.
- The clusters are also blueshifted, with NGC 869 approaching Earth at a speed of 38-39 km/s.

Wikipedia

Find “The Plough” and Polaris



The Plough is a shape or ‘asterism’ found in the constellation of Ursa Major.

It’s a good place to start because it’s a recognisable shape. It’s also close to the north pole of the sky, meaning it’s always visible for us in the night sky.

The two right-hand stars of the Plough are known as the Pointers.

Extend an imaginary line between them and out of the Plough and they’ll point to the Pole Star, which is also called Polaris.

Courtesy Sky at Night magazine

Move on to Cassiopeia

The Pole Star is the main star of the constellation Ursa Minor, the Little Bear.

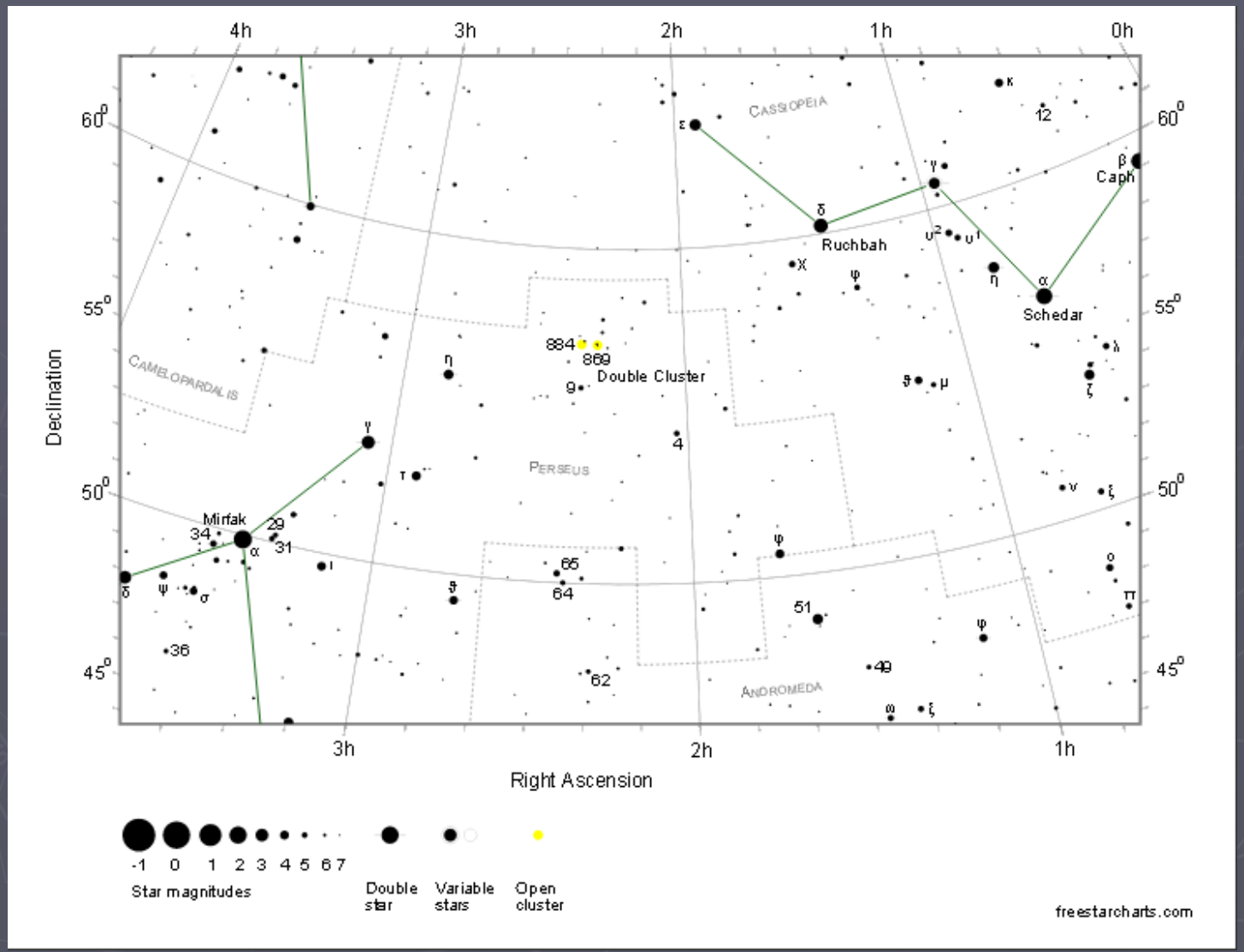
This is shaped like a smaller, fainter version of the Plough and you can trace its form arching off from Polaris.

Continue on in the same direction you took from the Plough to Polaris, for around the same distance again.

You'll find the distinctive 'W' of stars that make up the constellation of Cassiopeia.

Courtesy Sky at Night magazine

NGC869, NGC884 - “Double Cluster”



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Messier 81, 82

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- The M81 Group is a galaxy group in the constellations Ursa Major and Camelopardalis that includes the well-known galaxies Messier 81 and Messier 82, as well as several other galaxies with high apparent brightnesses.

- In a low magnification telescope view or a pair of binoculars this pair of galaxies make a superb sight.

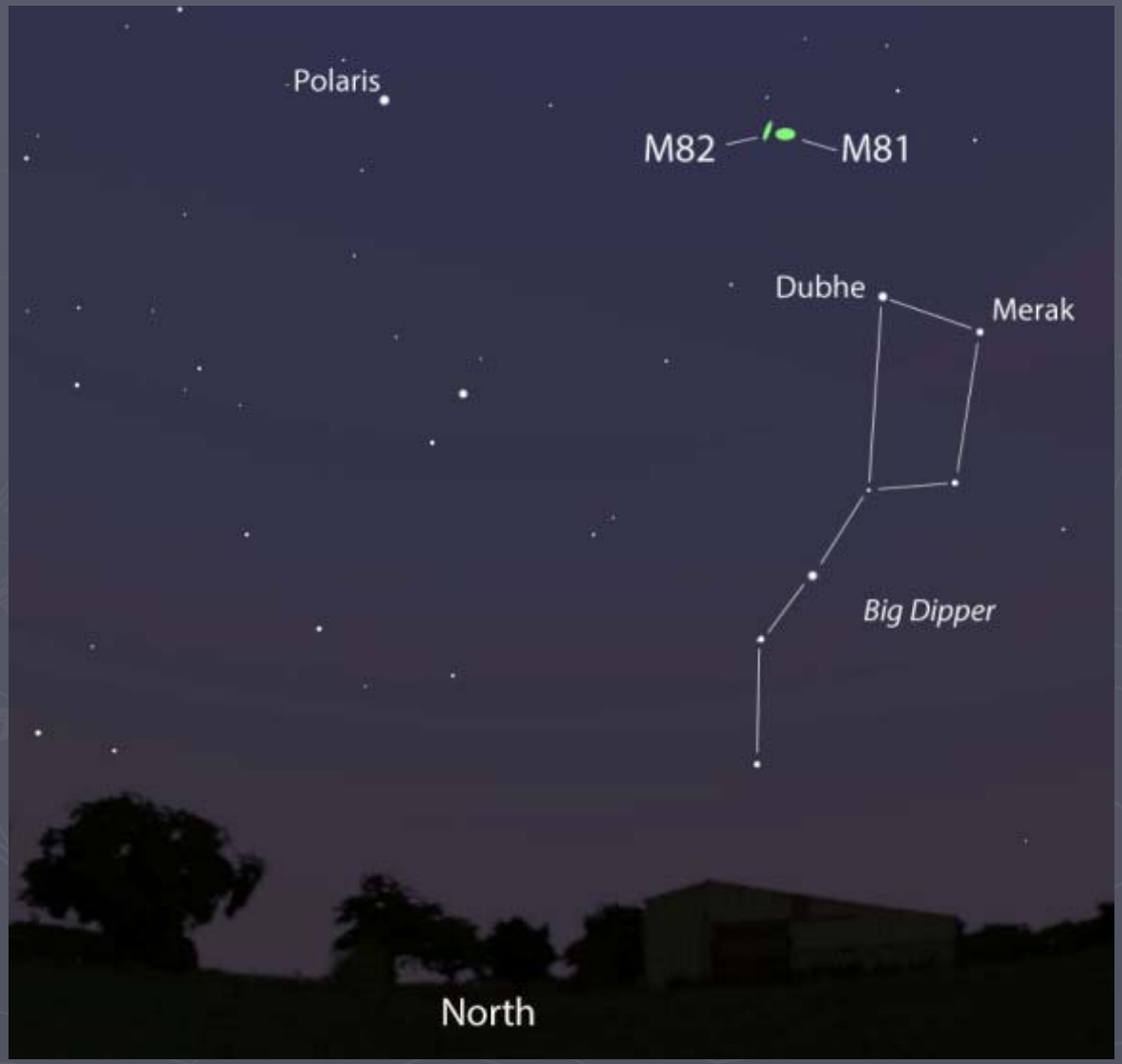
Wikipedia

One Wednesday, 11.5 million light years ago in M82

Supernova are happening all the time, somewhere in the universe.

Occasionally we spot one!

Messier 81, 82



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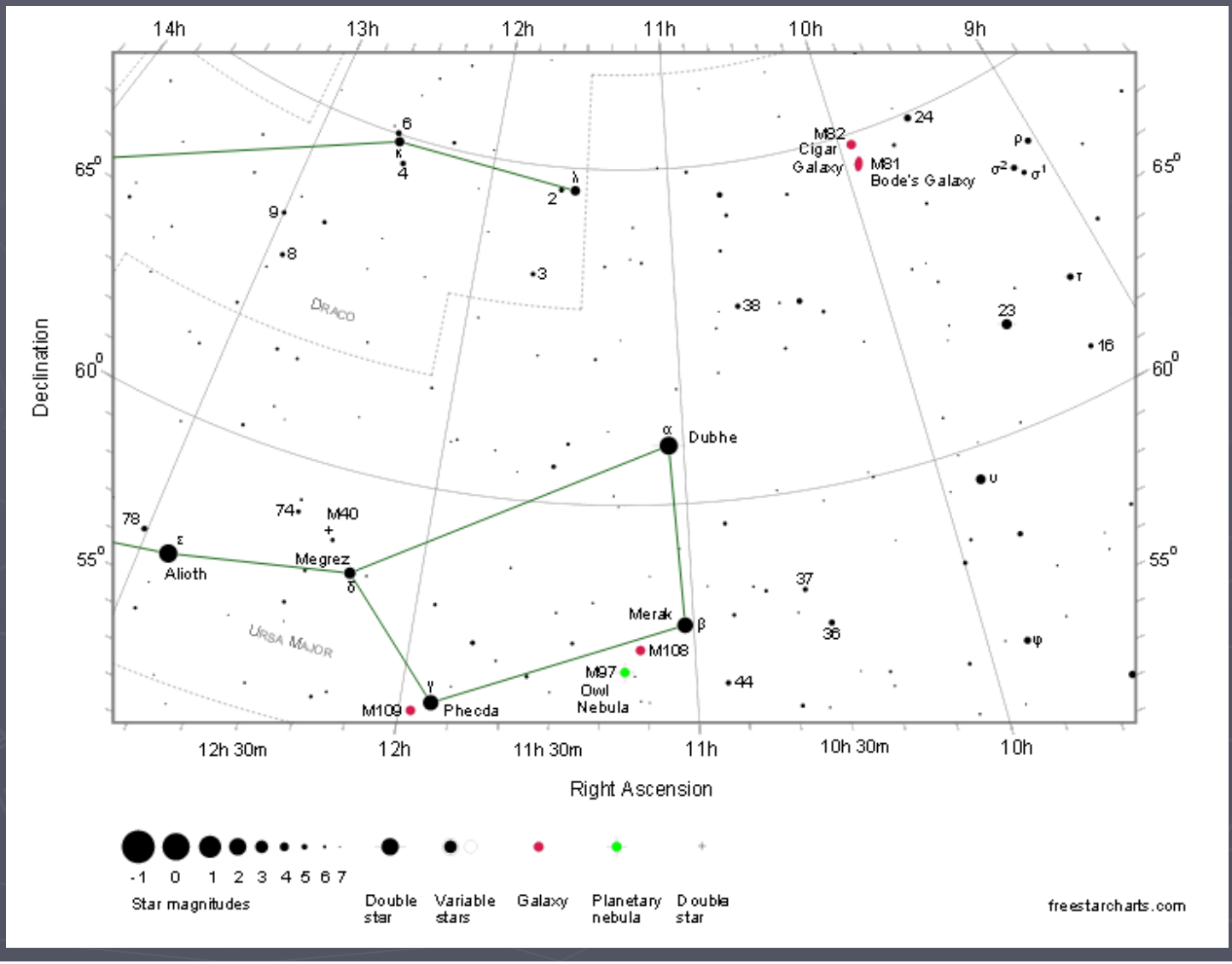

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Thank You!