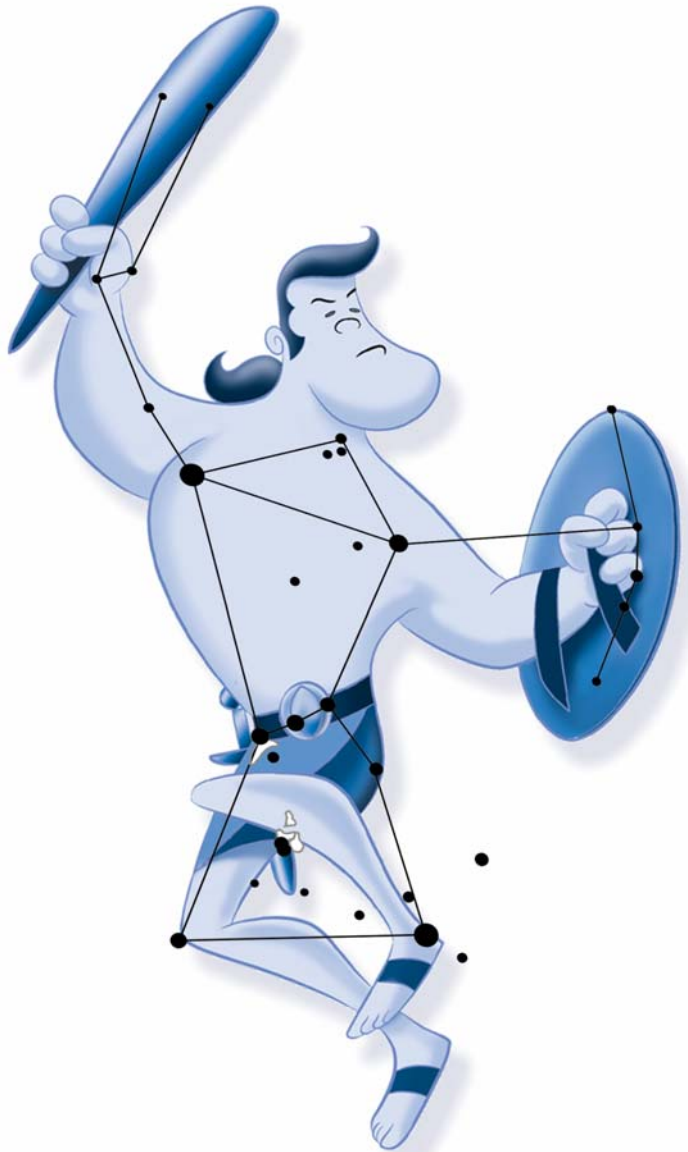


Legends of the Night Sky

Orion



Educator's Guide

Grades K - 8

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Introduction

It is our belief that "Legends of the Night sky: Orion" is the best multi-grade (K – 8), multi-disciplinary education package on the market today. It consists of a humorous 24-minute show and educator's package.

The Orion Educator's Guide is designed for Planetarians, Teachers, and parents. The information is researched, organized, and laid out so that the educator need not spend hours coming up with lesson plans or labs. This has already been accomplished by certified educators.

The guide is written to alleviate the fear of space and the night sky (that many elementary and middle school teachers have) when it comes to that section of the science lesson plan. It is an excellent tool that allows the parents to be a part of the learning experience.

The guide is devised in such a way that there are plenty of visuals to assist the educator and student in finding the Winter constellations. It is divided up into different levels based upon the students grade (K – 8). The multi-disciplined approach (science, math, english, geography, and history) makes it an excellent tool.

The information is presented in a segmented outline form. This is to allow, not only the educator, but the student to comprehend each piece of information. The outline form also makes it easier for the educator to make "overheads" for the lesson.

The lesson plans and labs are presented in a format that states the objective, purpose, required material, procedures and forms of assessment. A listing of all the National Educational Standards, that this manual complies with, are found in the appendix. The appendix, also has a section where the educator and student may make their own Winter Constellation Locator, overall Star / Constellation Locator and even Constellations Flash Cards. These can be used in conjunction with the lesson plans and labs.

What Are Constellations?

The original farmers throughout different civilizations knew, that for most crops, you had to plant in the Spring and harvest in the Fall.

In regions near the Equator:

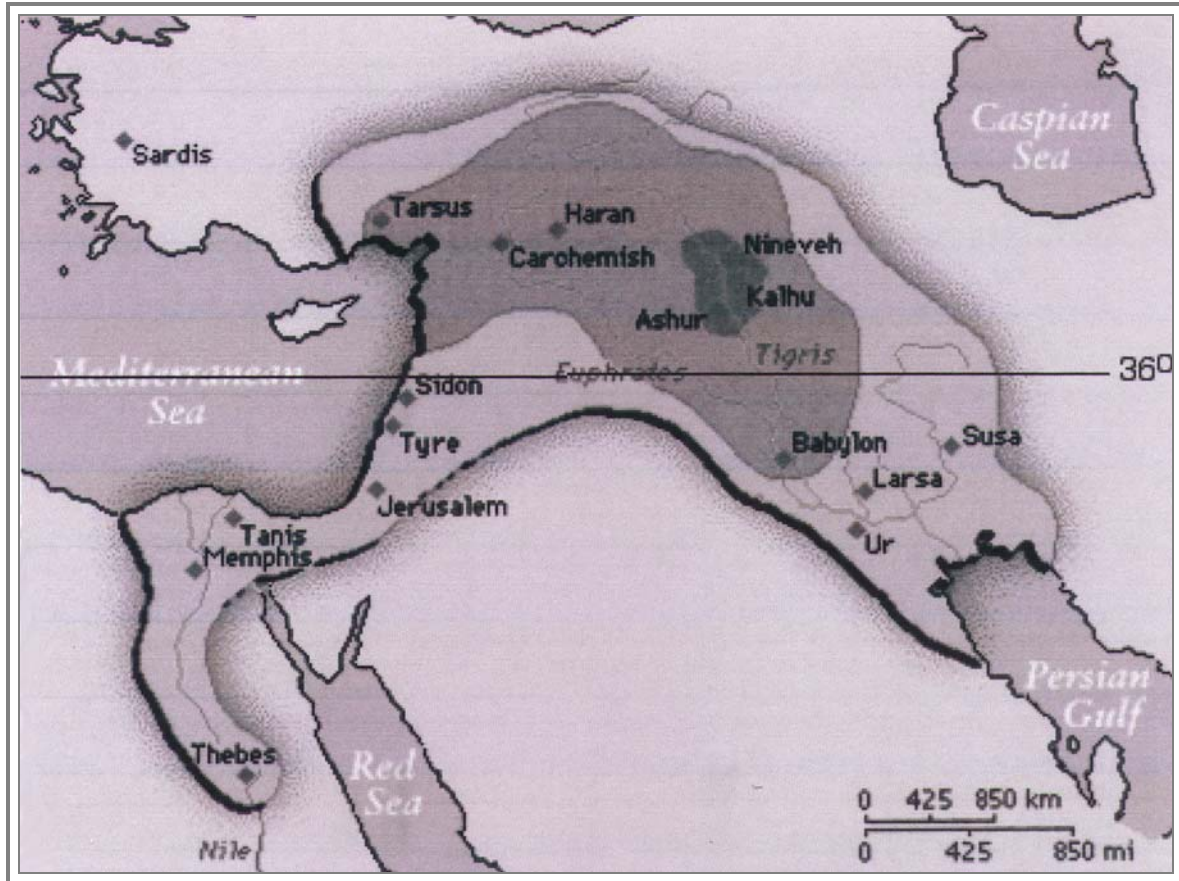
- There is not much difference between seasons.
- The only way to know how to plant and to harvest in those ancient locations was to look to the skies at the constellations.
- Different constellations are visible at different times of the year and are always consistent with the seasons.
- This is how the ancients were able to tell what month it was.
- The dependence upon the sky became a strong part of many civilizations very existence; from their farming to their religious worship.

Origin of Constellation System:

The constellation system that we have today came from the ancient Greeks. The stories, legends and reasons why they came to be in the sky originated the very first moment that man walked this Earth.

- The constellations were totally imaginary creatures, beings, and objects that farmers, poets, and astronomers made up in order to help predict seasons and even save their very lives.
- This occurred over the past 6,000 plus years.
- The oldest description of the constellations was written by the Greek Poet Aratus in 270 B.C.
 - In his poem *Phaenomena*, he mentioned that the constellations named had originated long before 300 B.C.
 - The constellations named were known to the Greeks and did not include those around the South Pole.
 - This can be explained, due to the fact, that the ancient Greeks and Egyptians could not see the Southern Polar constellations, for they fell below the horizon.
- In Aratus' poem, we are able to deduce that most people responsible for the original constellations lived near a latitude of approximately 36 degrees North. (Latitudes are lines that run parallel to the equator and are used to determine your placement North or South of it).
 - This places the origin in latitudes below the south of Greece and yet north of Egypt.
 - This basic area of latitudes is very similar to the latitudes of ancient Bablyon and Sumeria.

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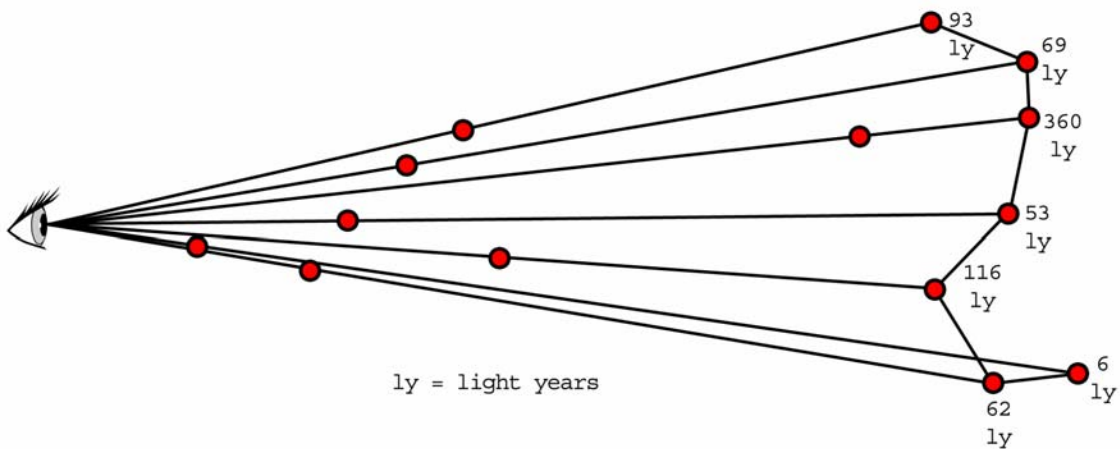
- Around the year 2,000 B.C., the uncharted area (the area where no constellations are mentioned in Aratus' poem) is centered on a place in the sky where the South Celestial Pole would have been located.
 - This coincides with the time of the Sumerians and the Babylonians.
 - It is highly likely that the Sumerians and the Babylonians originated the idea of the constellations and even the myths of how they came to be.
- It is quite possible, because of the nomadic nature of humans, the knowledge of the constellations made its way to Crete and to the Minoans.
 - One of the results of the trade between Crete and Egypt was that the knowledge of the constellations found its way into Egyptian Culture.
- It was in Egypt where the Early Greek astronomers first heard about the constellations and wrote about them.

What Really Makes up Constellations?

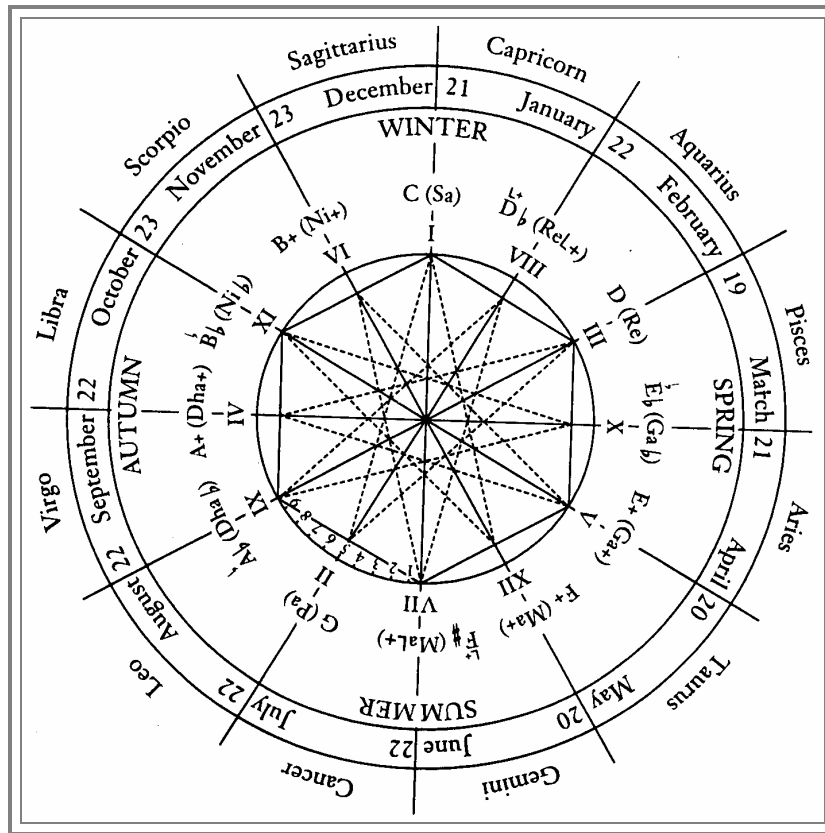
The apparent groupings of stars into the constellations that we see in the sky are not physical groupings.

- The constellations are optical projections on the celestial sphere.
- The distances between the Earth and all the stars that make up the constellations are not the same.
 - Most distances are very different
- The stars appear to be grouped because they lie in approximately the same direction or region of the sky.

- The stars that make up the constellation, The Big Dipper, are a very good example of the aforementioned explanation:



Astrological Constellations (Rubbish?!?):



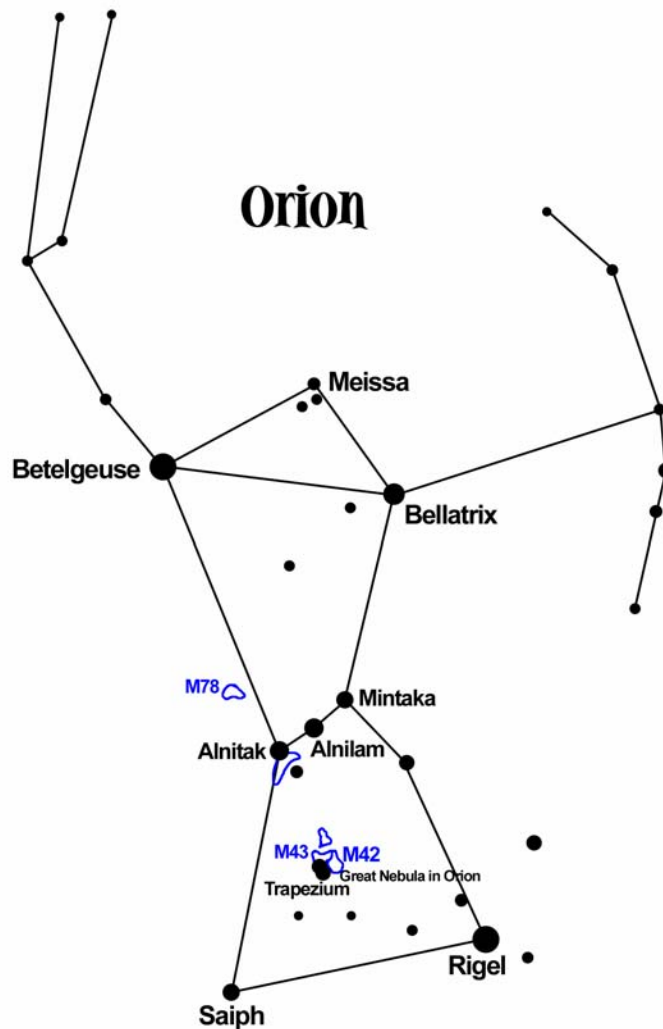
There are 12 constellations that fall in an area we call the Zodiac. The Zodiac is an imaginary band that is 18 degrees wide and is centered on the Ecliptic.

- The Ecliptic is a great circle that is a projection of the path in which the Sun takes through the stars in its annual motion.
 - It is tilted by 23.5 degrees with respect to the Celestial Equator.
- The constellations of the Zodiac were at one time thought to have great mystical and astrological significance.
 - Astrology today is classified as a New Age mystical way to predict your future and is usually considered nonsense.
- The constellations of the Zodiac are still important because, the planets, Sun and Moon are all on or near the ecliptic at any given time.

Why Use Constellations in Today's World?

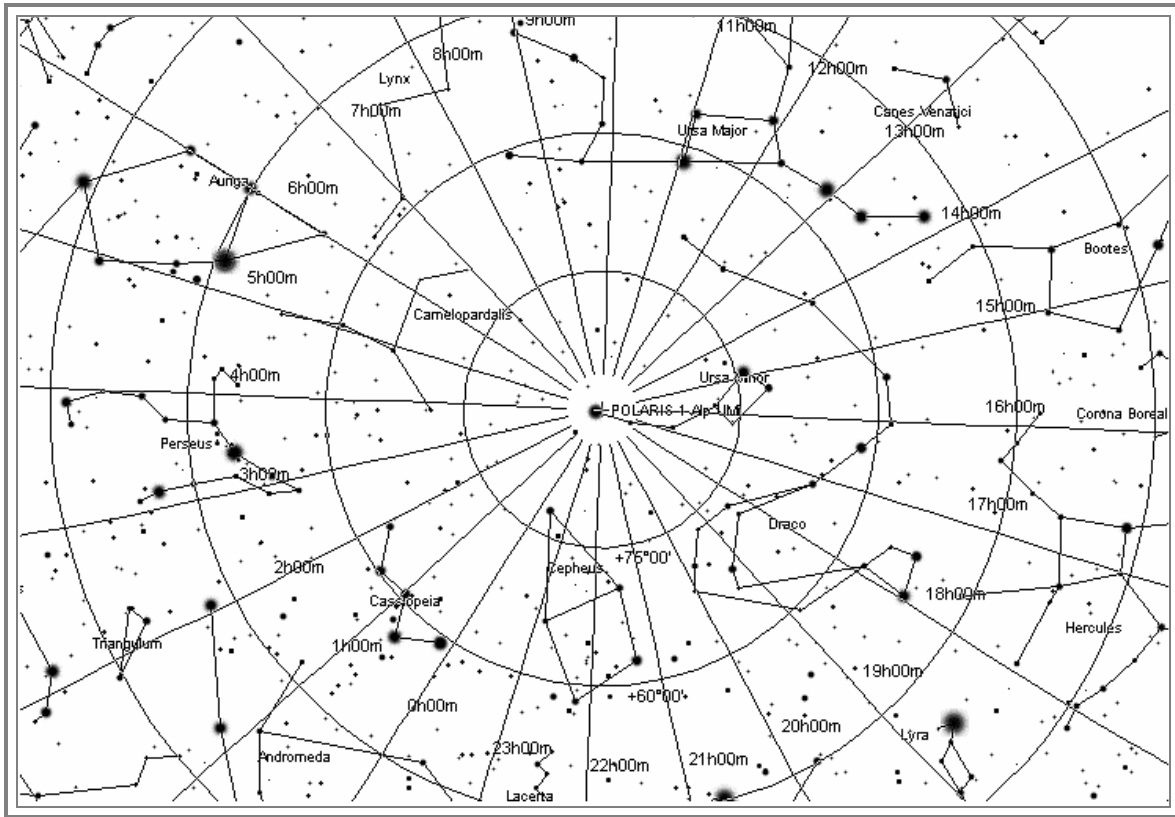
In today's world, constellations define imaginary regions of the sky.

- Constellations are a significant geographical region in the sky.
 - It is as if the individual countries of the world are defined as imaginary regions on the face of this Earth.
 - Constellations are no longer mythologically important.
- When we say that the M78 is in the constellation Orion, it is like saying that France lies in Europe.



- Modern constellation boundaries are irregular and have been agreed upon by various astronomical societies based upon various reasons.

Finding Constellations in the Night Sky



Circumpolar Constellations:

- Constellations that circle close around the north pole, which can be seen every night of the year.

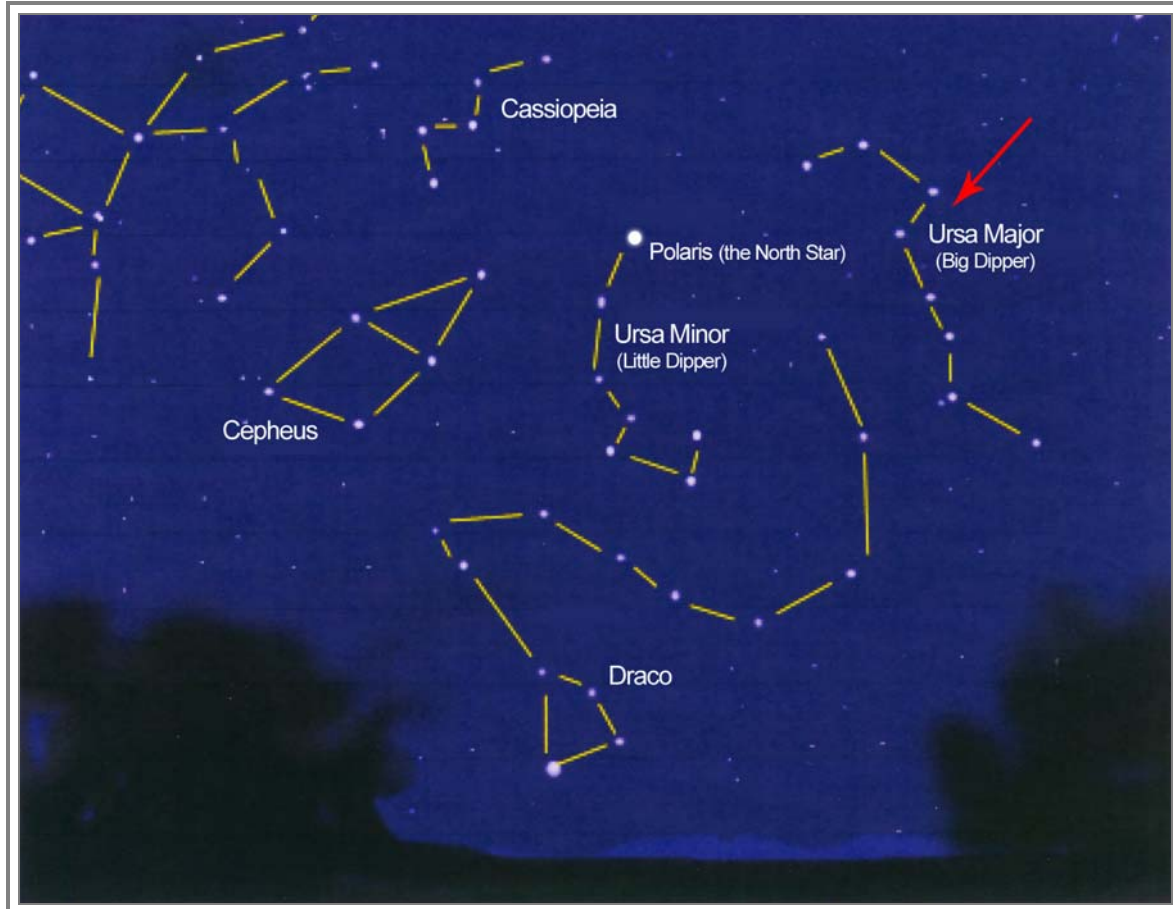
Five Major Circumpolar Constellations:

- Ursa Major (the Big Dipper), Ursa Minor (the Little Dipper), Cassiopeia, Cepheus, and Draco.

- These are visible year-round in the north; therefore, they are some of our most recognizable constellations.

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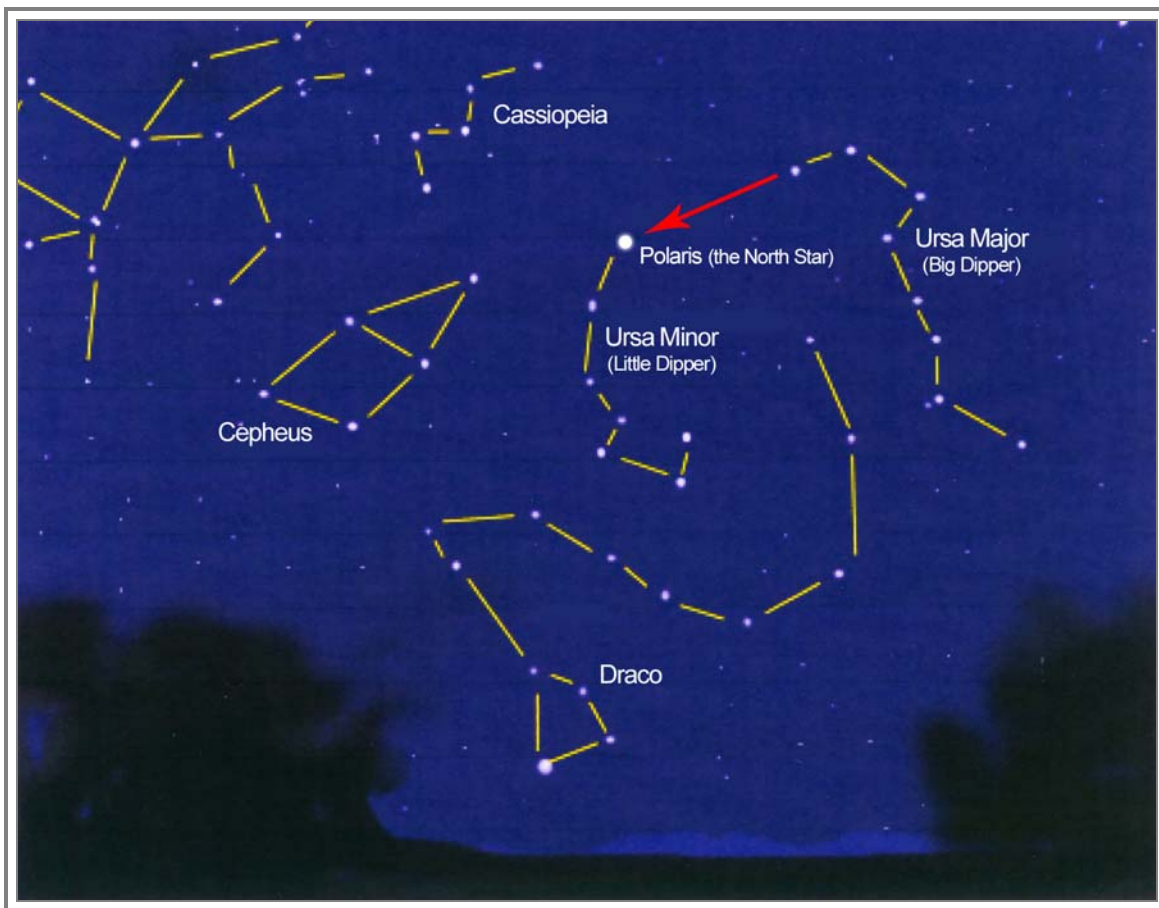
- Hopefully you've found **Ursa Major** (the Big Dipper) in the north. This is the one constellation that everyone seems to know quite well.



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To find **Ursa Minor** (the Little Dipper) using **Ursa Major** (the Big Dipper) as your guide.):

- Follow the two stars at the end of the bowl in a straight line for approximately 30 degrees (or three fists held at arm's length) and you will end up on the north star.
 - **Polaris**, the **North Star**, is the star closest to true north.
- For this reason, it has long been used for navigation.
- It is also the end of the handle of the Little Dipper



- The Little Dipper is made up of rather faint stars, so Polaris might be about all you can see.
- On a clear night you should be able to make out the two stars at the end of the bowl of the dipper.
- Notice the handle of the Little Dipper bends the opposite way to the Big Dipper.

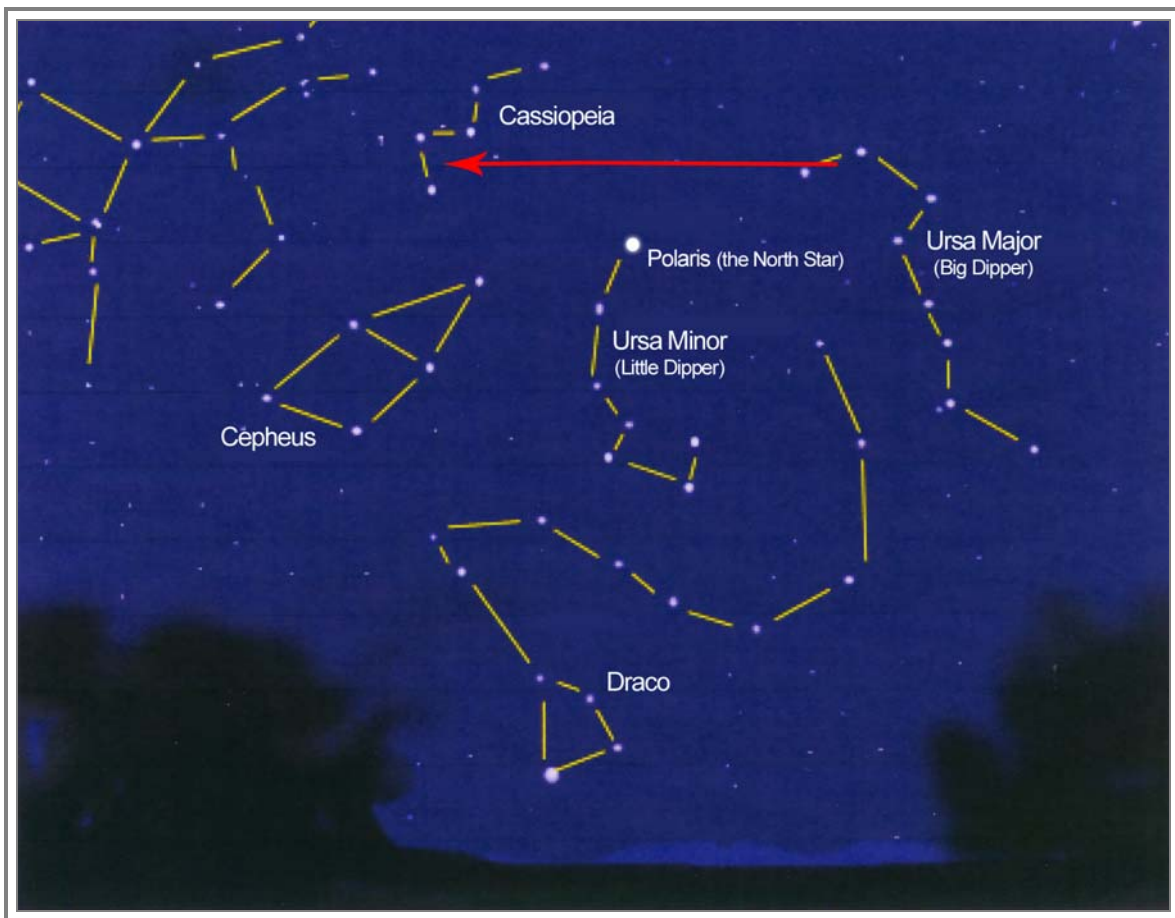
The Big and Little Dippers are linked in their proper constellation names too.

- They are the big and little bears, Ursa Major and Ursa Minor.

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The constellation **Cassiopeia**; According to legend, queen of a powerful land:

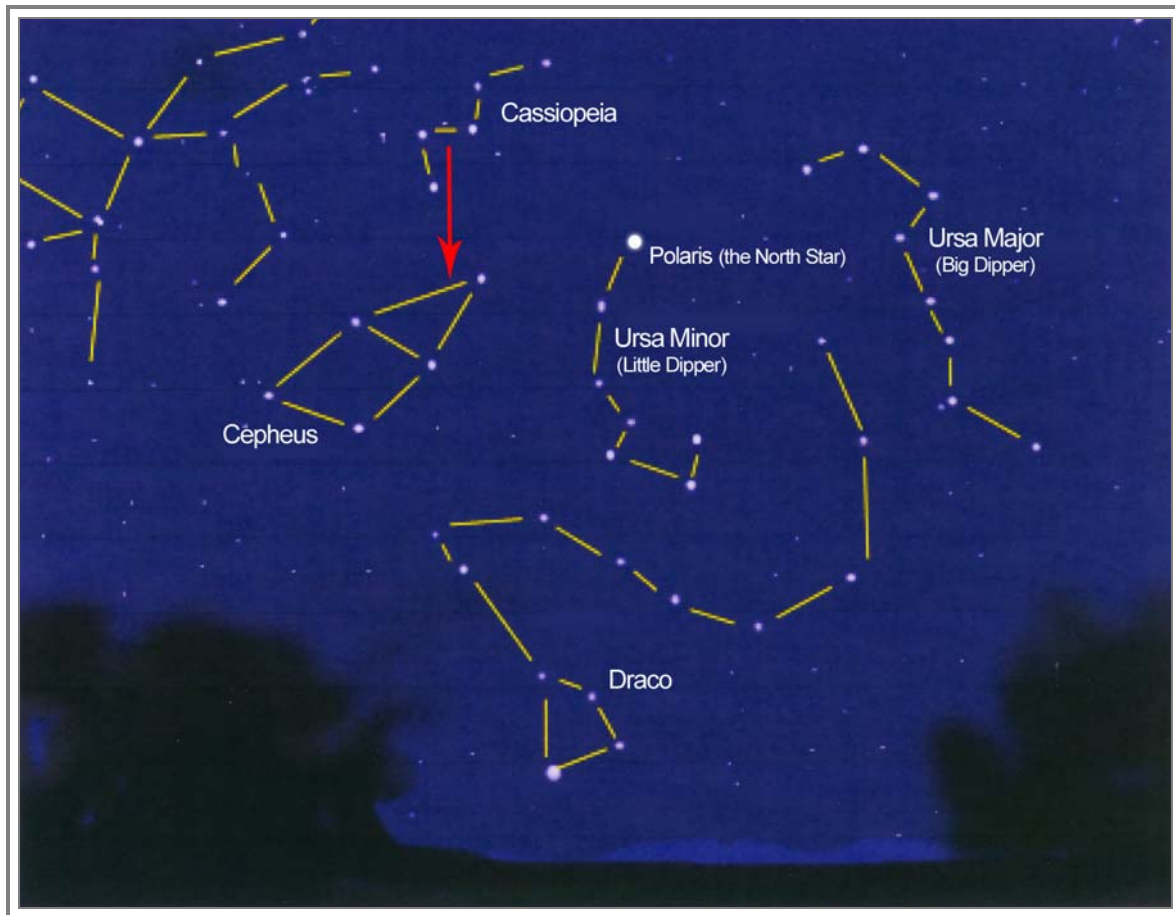
- Cassiopeia looks like a "W" or an "M", depending on the time of year.
- The "W" is Cassiopeia's throne.
- All of her stars are bright, so this is another easy one to see.
- Find Cassiopeia by following the same two stars in the bowl of the Big Dipper past the north star and keep going another 30 degrees or so, to the "W" of stars.



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The constellation **Cepheus**: the King to Cassiopeia's queen

- Constellation stars are a bit fainter, but still visible.
- Cepheus, looks like a tall skinny house or a square with a triangle on top.
- You can find Cepheus by imagining Cassiopeia sitting on her throne (inside the "W") looking at Cepheus.
- The roof-top of the house sits between the north star and Cassiopeia.



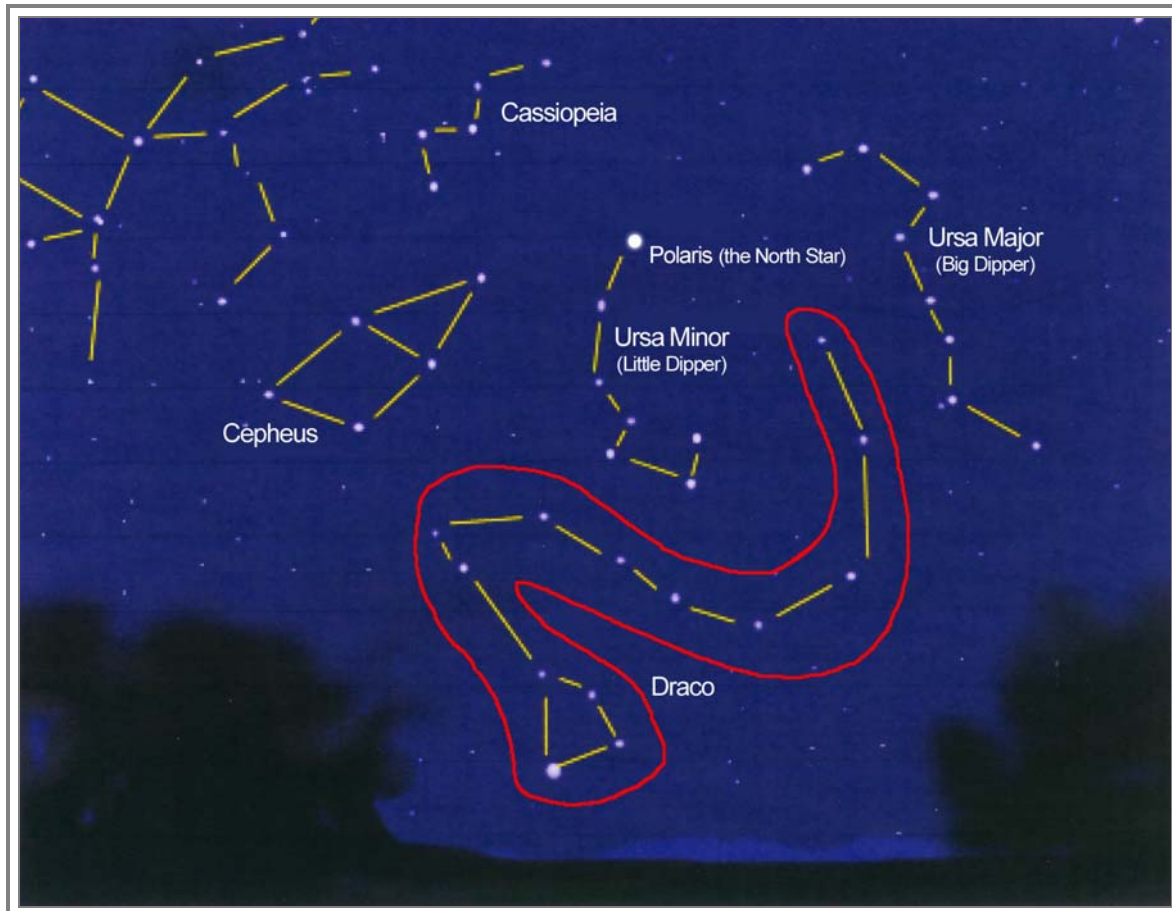
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The constellation **Draco**, the dragon:

- Winds between the Big and Little Dippers.
- Generally takes up all of the remaining bright stars between those two constellations.
- Draco's head hangs down near Cepheus.
- Draco is probably the toughest circumpolar constellation to find,
- If you can find it, you could tell the '*dragon heaven*' story from the movie Dragonheart.

All other constellations are far enough south that as the earth rotates:

- These stars rise and set.
- Different constellations are visible at different times of night.
 - Since the stars rise 4 minutes earlier each night, different constellations are also visible in different seasons (at any particular time of night).

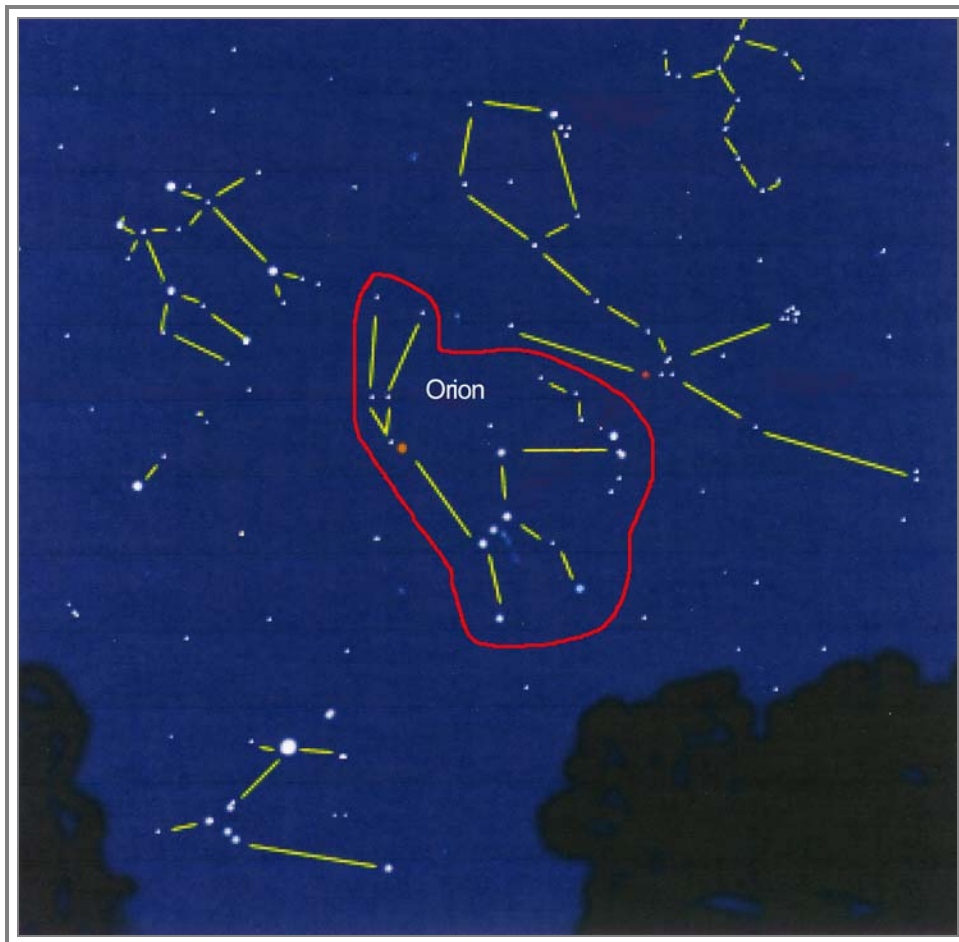


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Winter: The season of Orion:

The constellation, **Orion**; the hunter:

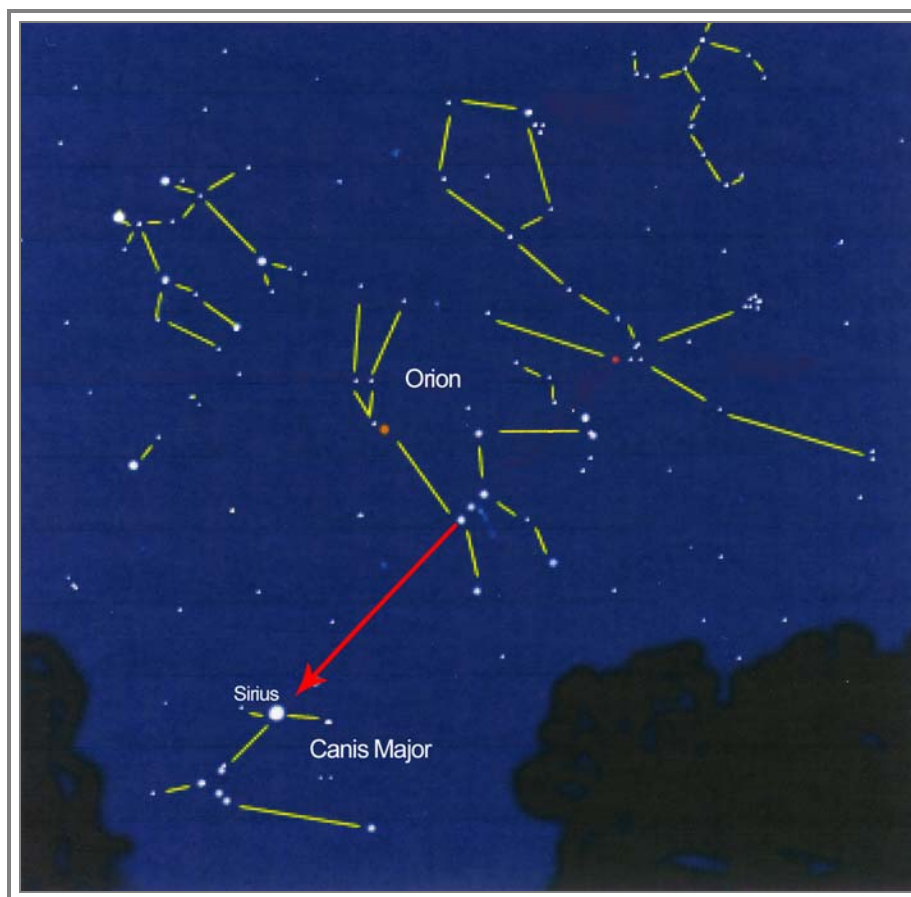
- You can find Orion by looking for three closely set stars in his belt a little further south than overhead. (Once you have seen these a couple of times you will be able to recognize them anywhere.)
- Orion's shoulders (the two bright stars above his belt, to the north).
- Two feet (the two bright stars further south).
- A scabbard hanging from his belt (which may be a little faint to see here).
- Orion is the key to the winter constellations;
 - You can find the other winter constellations by using reference points on Orion.



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The constellation, **Canis Major**; the big dog:

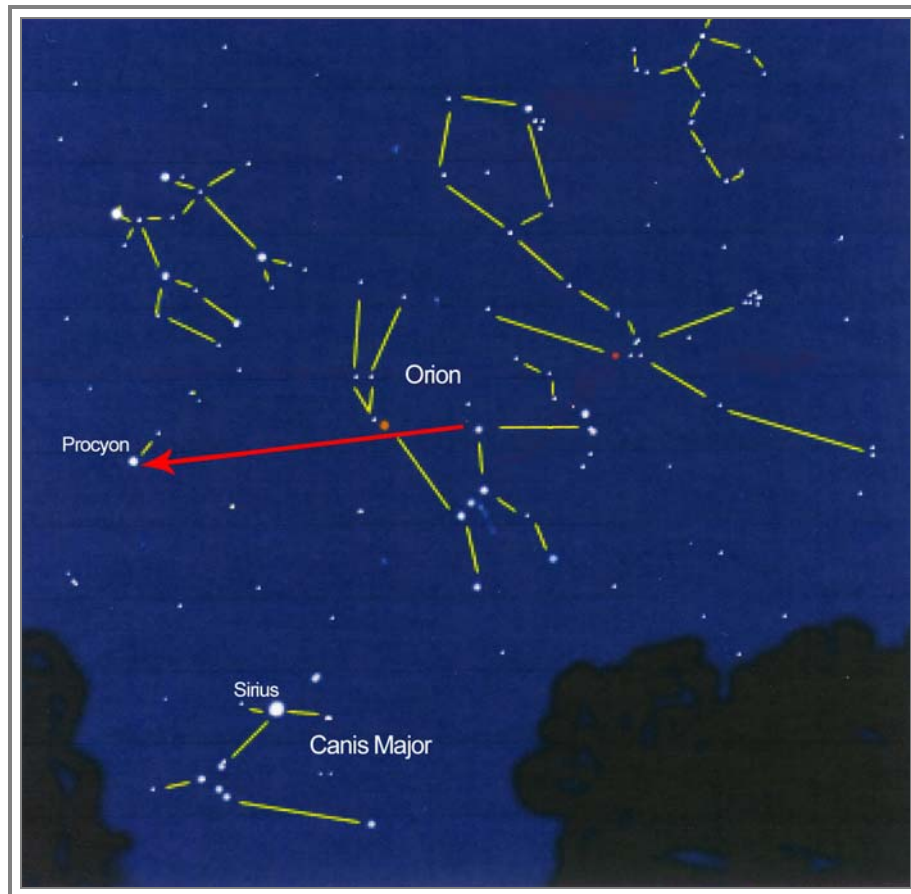
- **Sirius**; the dog star:
 - Find Orion's belt, and follow an imaginary line through it until you come to a very bright star.
 - It is the brightest star in the night sky.
 - There are many stories involving Sirius.
 - In ancient Egypt it was called the "Nile Star" or the "Star of Isis"
 - Its annual appearance, preceding sunrise on the day of the summer solstice, marked the ensuing rise of the Nile River.
 - In medieval Europe it was associated with the "dog days of summer"
 - It was thought that the summer heat resulted from the mixing of the Sirius's light with that of the Sun.
 - Its appearance was regarded as an evil omen.
 - The rest of the body of the dog is closer to the horizon and fainter, but does follow a stick figure of a dog.



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The constellation, **Canis Minor**; another dog that is not so lucky:

- The little dog is indeed 'little', only two stars.
- The brighter one of these is **Procyon**.
- It can be found by following an imaginary line through Orion's shoulders and approximately straight up from Sirius.

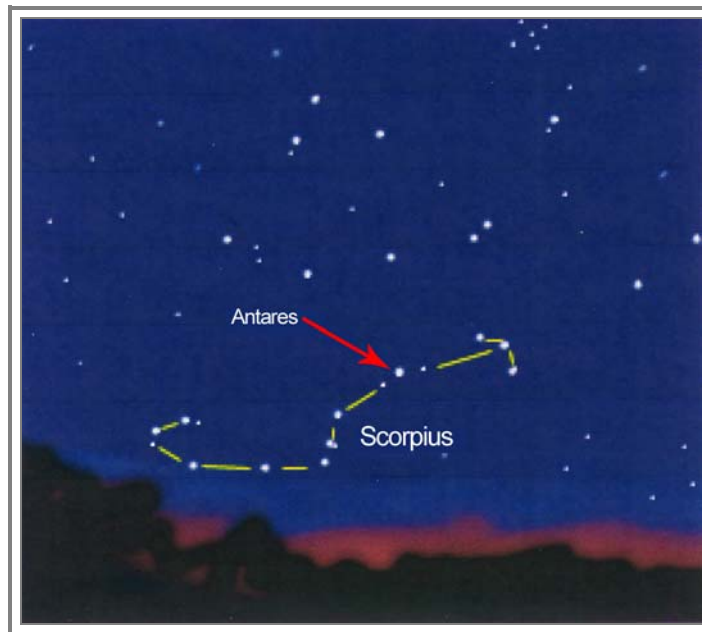


Canis Minor and Canis Major are the two hunting dogs of Orion, following at his heels through the sky.

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The constellation, **Scorpius**; the scorpion:

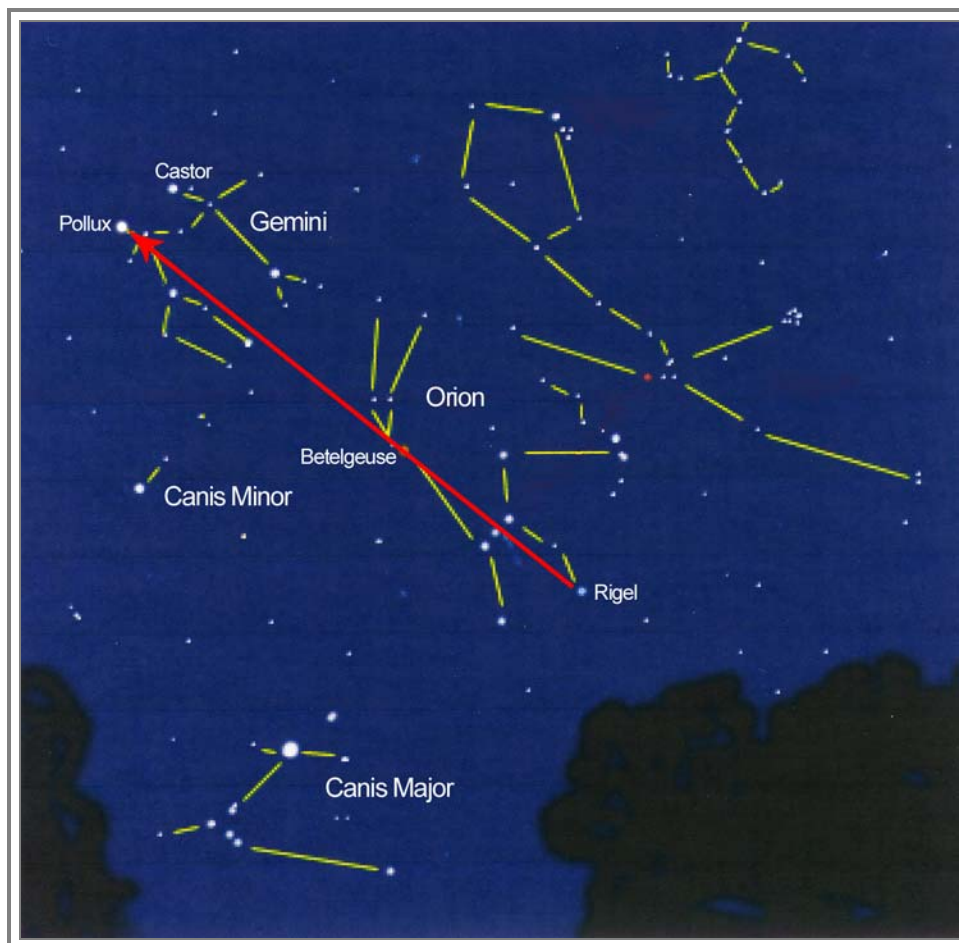
- You can find Scorpius in the early morning. Just as Orion is setting in the northwest; look to the south east.
- On the horizon, you will find the star Antares, which lies in the body of Scorpius.
- Orion and Scorpius were given honored places in the sky.
- They were placed at the opposite ends of the sky, so that they would never engage in battle again.



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The constellation, **Gemini**; the twins:

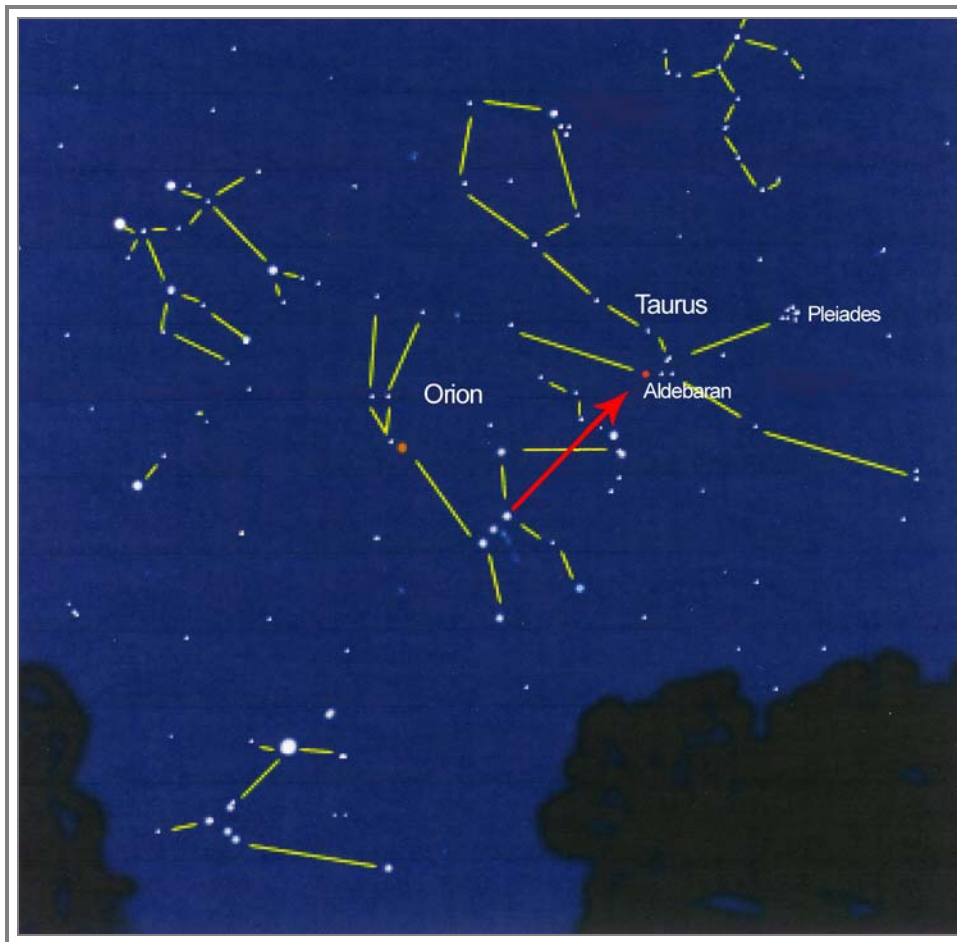
- An imaginary line through **Rigel**, Orion's right foot, and up through **Betelgeuse**, Orion's left shoulder, points toward **Pollux**; the brightest star in Gemini.
- Gemini has a kind of box like shape.
- It is best recognized by its "twin stars".
- **Castor** and **Pollux** appear very similar,
- They are separated by only 4.5 degrees.
- Castor and Pollux are each the head of one twin.
- Stick figures descend from these heads towards Orion, making up the rest of the constellation.



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The constellation, **Taurus**; the bull:

- Taurus is a large constellation in the winter sky.
- It carries the **Pleiades** on his back.
- Follow Orion's belt in roughly a straight line in the opposite direction of Sirius. (so follow it to the west).
- You will find yourself near a big "V" in the sky.
 - This V is Taurus's face and it contains the bright star **Aldebaran**.
- The rest of Taurus is made up of a body somewhere in the stars nearby;
- Faintly, you can see two front legs.
- If you follow the two branches of the "V" upward, you find the tip of Taurus's horns.



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The constellation, **Auriga**; the goat herder:

- It is perhaps easiest to find by following Taurus's horns to **Capella**.
 - Capella is one arm of a stick figure, that holds three goats under it.
 - The three goats look like a tiny triangle of stars.
 - Auriga is also called the charioteer.
 - You can make the same stars into something that looks like a chariot driver sitting down, holding the reins.
 - Several open star clusters are located in Auriga.
 - Each contain about one hundred stars.
 - If you find a dark location, these would appear as fussy knots in binoculars.

