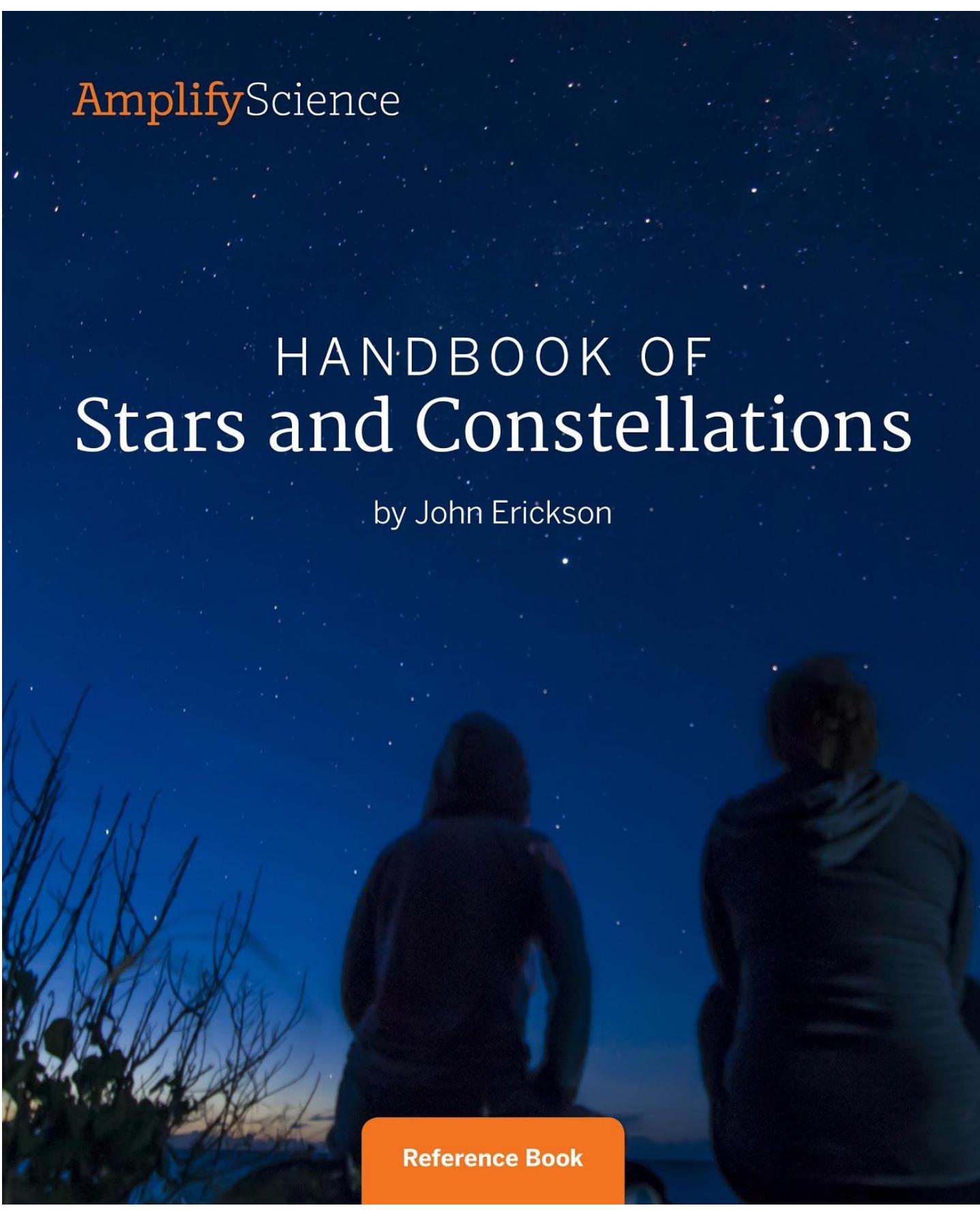


AmplifyScience

# HANDBOOK OF Stars and Constellations

by John Erickson

A photograph showing the silhouettes of two people from behind, looking up at a dark blue night sky filled with stars. Bare tree branches are visible in the lower-left foreground.

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# **Handbook of Stars and Constellations**

by John Erickson





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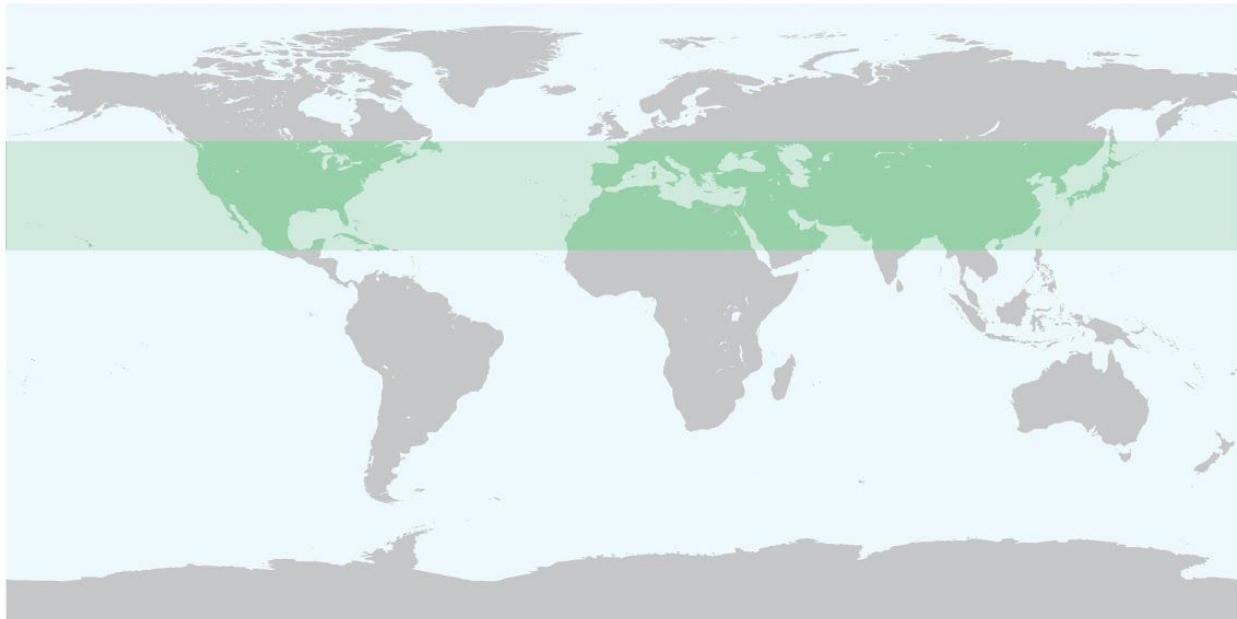
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**This book works best for people who live somewhere within the green section of the map.**

## About This Book

There are billions of interesting objects in space. Most of them are so far away that you can't observe them at all, or only with a large **telescope**. This book is not about those objects. It is mostly about things you might actually see with your own eyes. This book also includes a few things that you can see with binoculars or a small telescope.

The objects in this book are organized by the **constellations** they appear in. You can see different constellations depending on the time of year and the time of night. Near the end of this book are maps to guide you about where and when to look for constellations.

The constellations you can see also depend on where you are on **Earth**. This book is made for sky watchers in the middle of North America. It will also be useful for people in most of Europe, North Africa, and Asia.

# Constellations

## What Is a Constellation?

People have found many ways to keep track of **stars**. One way is to find recognizable arrangements of stars. There are many ways to group the stars, but sky watchers have settled on 88 groupings of stars called **constellations**.

**Astronomers** have agreed on the boundaries where one constellation ends and the neighboring constellation begins, so that each constellation covers a section of the sky. Together, the 88 constellations cover the entire sky in every direction. The constellations are named for animals, gods, heroes, kings and queens, and magical objects from ancient Greek and Roman stories.



Imagining lines that connect the stars can help people recognize constellations.



People used to imagine animals, people, and other shapes in the stars. They named the constellations after these things.



The constellation Cygnus is not a stick figure or a bird. It is a patch of the sky and everything in it.

# What's in a Constellation?

## Stars

A **constellation** includes all the **stars** within its boundaries. The stars in this book are bigger than the sun, but most stars are actually smaller than the sun, and too faint to see without a **telescope**. When we observe using only our eyes we see only the brightest stars. The stars do not change their position in a constellation, or move from one constellation to another. People often use the term “fixed stars” because we always see the stars in the same arrangements at night. There is one star that is different: the sun.

### The Sun, a Special Star

Even though it's a star, you won't see the sun on any of the star maps in this book. That's because to us on **Earth**, the sun seems to move from one constellation to another. Every **year**, we see the sun pass through 13 constellations in the same **pattern**. The sun is not actually moving through the constellations, it just looks that way from our moving **planet**.

You can't observe constellations when the sun is in the sky because the light from the sun overwhelms the light from all the other stars. The sun is much closer to Earth than any other star, so the sun's light looks much, much brighter than the light from other stars.



**The sun is the only star that doesn't look like a tiny dot from Earth.**

## Star Clusters

Some constellations have groups of stars called clusters. Many star clusters can be seen only with a telescope, but a few are visible with the unaided eye or with binoculars.



**This star cluster is in the constellation Taurus.**

## Nebulae

A **nebula** (NEB-you-luh) is a cloud of dust and gas in space. It may be a place where new stars are being formed or a place where an old star blew apart. We can see a nebula if it is glowing or if light from nearby stars is shining on it. Only a few nebulae are visible without a telescope.



This nebula is in the constellation Sagittarius.

## Other Galaxies

Almost all of the stars, star clusters, and nebulae we see are part of the huge collection of objects we call the Milky Way, which is the **galaxy** we call home. Beyond the Milky Way Galaxy there is a vast amount of empty space, and then there are other galaxies. With large telescopes we can see millions of galaxies in every constellation, but only a few of them are visible with the unaided eye.



This galaxy is in the constellation Andromeda.

## The Moon and the Planets

The planets in our **solar system** and the Moon are not on any of the star maps in this book. That's because they are moving all the time, so we can't put them in any one place on a map. The Moon and the planets don't stay within the boundaries of any one constellation.



This diagram shows the planets moving around the sun in our solar system.

## Andromeda

Andromeda (an-DRAH-me-da) looks like a narrow “V” shape. It is named after a beautiful princess from Greek mythology. She was chained to a rock to be eaten by a sea monster, but was saved just in time by the hero Perseus.



The Andromeda Galaxy

### What to look for in Andromeda:

#### **The star Alpheratz (AL-fer-ats)**

**Distance from the sun:** 97 light-years  
**Diameter:** about 7 million km  
(about 5 times the sun’s diameter)

Alpheratz is the 54th-brightest **star** in the night sky. It is very near the border between Andromeda and Pegasus, and actually forms one of the corners of the Great Square of Pegasus.

#### **The Andromeda Galaxy**

**Distance from the sun:** 2.5 million light-years

If you are in a place where the sky is very dark and clear, you might be able to just barely see this **galaxy** without a **telescope**. It is a faint smudge of light about as big as the Moon. It is one of the most distant things we can see without a telescope. Like our own galaxy, the Milky Way Galaxy, the Andromeda Galaxy is made up of hundreds of billions of stars.

## Aquarius

Aquarius (ah-KWAIR-ee-us) is one of the 13 **constellations** that the **sun** appears in during the **year**. The sun is in Aquarius from the middle of February to early March. Its name is Latin for “water carrier.”



### What to look for in Aquarius:

#### The Helix (HEE-licks) Nebula

**Distance from the sun:** 643 light-years

This glowing cloud of dust and gas surrounds a dying **star**. You need binoculars or a **telescope** to observe this **nebula**.



This picture of the Helix Nebula was made using a large telescope in space. With binoculars or a small telescope you would not see the colors or other details as well.

## Aquila

Aquila (AH-kwill-ah) has just one bright **star**, which is part of the shape called the Summer Triangle. Aquila means “eagle” in Latin, and the **constellation** is named for the bird that carried Zeus’s thunderbolts in Greek mythology.



### What to look for in Aquila:

#### The star Altair (AL-tare)

**Distance from the sun:** 17 light-years

**Diameter:** about 3 million km

(about 2 times the sun's diameter)

Altair is the 16th-brightest star in the night sky, and one of the closest stars visible from **Earth**. Altair is at one of the corners of the Summer Triangle. The star Vega in the constellation Lyra and the star Deneb in the constellation Cygnus are at the other two corners.

### Did you know that sometimes it looks like a new star is in the sky?

In 1918 astronomer Grace Cook observed that a very faint star in the constellation Aquila was getting brighter. Soon after, everyone knew it because it became one of the brightest stars in the night sky. Over several weeks the star faded, and today you can see it only with a telescope. A star that becomes bright for a while like this is called a nova.



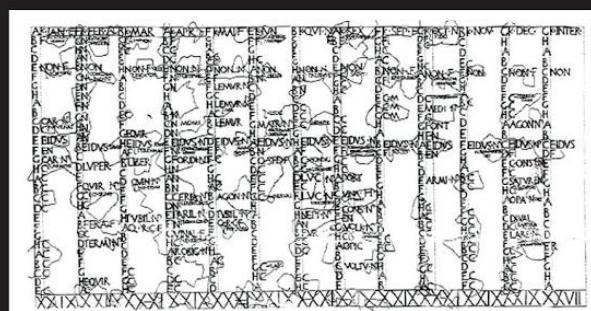
## Aries

Aries (AIR-eez) is one of the 13 **constellations** that the **sun** appears in during the **year**. The sun is in Aries from around the middle of April to the middle of May. Aries is Latin for “ram” (a male sheep). It is a relatively dim constellation.



### Did you know that the new year used to begin in spring?

In early Roman times, people began the new year when the sun was in the constellation Aries, on the first day of spring. They called that day the first of Martius. That was over 2,000 years ago, and since then many things have changed in the sky and in the calendar. Now the month of Martius is called March, spring begins around March 21, the sun is not in Aries until April, and the year begins in winter on our calendar.



An ancient Roman calendar

## Boötes

Boötes (bo-OAT-eez) looks like a kite with a very bright **star** at the bottom corner. Boötes means “ox driver.”



### What to look for in Boötes:

#### The star Arcturus (ark-TOUR-us)

**Distance from the sun:** 37 light-years

**Diameter:** about 35 million km  
(about 25 times the sun's diameter)

Arcturus is the 4th-brightest star in the night sky. It is slightly more orange than other stars. Compare it to the star Vega in the **constellation** Lyra, which is often up at the same time as Arcturus, especially in the summer. Arcturus and Vega are almost exactly the same brightness, but Vega is whiter than Arcturus.

## Cancer

Cancer (CAN-sir) is one of the 13 **constellations** that the **sun** appears in during the **year**. The sun is in Cancer from late July to early August. Cancer fills the space between Leo and Gemini, but it has no bright **stars**. Cancer is Latin for “crab.”



### What to look for in Cancer:

#### The Beehive Cluster

**Distance from the sun:** 577 light-years

On a dark night, you can just barely see the Beehive Cluster without a telescope. It looks like a tiny smudge of light, but it is actually a group of about 50 faint stars. With a **telescope** or binoculars you might see the cluster as a swarm of stars.



**The Beehive Cluster**

## Canis Major

Canis Major (CANE-us MAY-jur) has a few bright **stars**, but it is recognizable by one star that outshines them all: Sirius, the Dog Star. Canis Major is Latin for “big dog.” Along with Canis Minor, it is often said to be following the **constellation** of Orion, the hunter.



### What to look for in Canis Major:

#### The star Sirius (SEER-ee-us)

**Distance from the sun:** 8.6 light-years

**Diameter:** about 2.4 million km  
(about 1.7 times the sun's diameter)

Sirius is the brightest star in the night sky. It is also one of the closest stars that we can see from **Earth**.

## Canis Minor

Canis Minor (CANE-us MY-nur) is a small constellation with only one bright star. Its name is Latin for “little dog.”



### What to look for in Canis Minor:

#### The star Procyon (PRO-see-on)

**Distance from the sun:** 11 light-years

**Diameter:** about 3 million km  
(about 2 times the sun's diameter)

Procyon is the 8th-brightest star in the night sky. Like Sirius in the constellation Canis Major, it is one of the closest stars we can see from Earth.

## Capricornus

Capricornus (cap-ri-CORN-us) is one of the 13 **constellations** that the **sun** appears in during the **year**. The sun is in Capricornus from late January to the middle of February. Capricornus is in the space between Sagittarius and Aquarius. Its name comes from a mythical creature that is half goat and half fish.



### What to look for in Capricornus:

#### The star cluster M30

**Distance from the sun:** 27,000 light-years

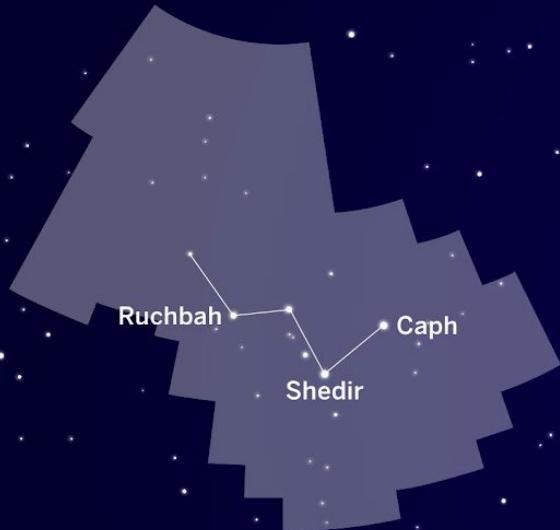
This cluster of **stars** is visible with binoculars or a small **telescope**. It contains hundreds of thousands of stars in a region that is less than 100 **light-years** across.



**The star cluster M30**

## Cassiopeia

Cassiopeia (kass-ee-oh-PEE-uh) looks like a large “W” in the sky. Cassiopeia was a queen in Greek mythology and the mother of Andromeda. Some people imagine the **stars** in the **constellation** look like her throne, which is upside down half the time. The old stories say Cassiopeia must flip over every day as punishment for the trouble caused by her pride.

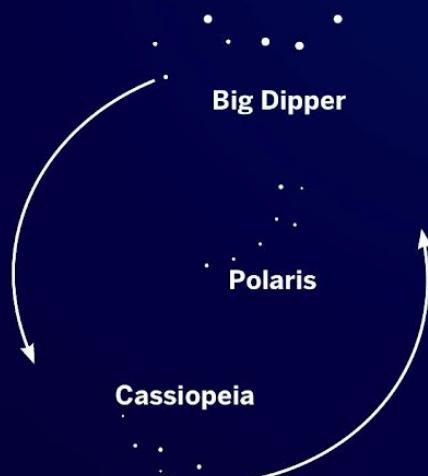


### What to look for in Cassiopeia:

#### The motion of Cassiopeia and the Big Dipper

Cassiopeia is one of the constellations that does not rise or set, as seen from much of the Northern Hemisphere. Instead, Cassiopeia seems to move in a circle around the star Polaris in the constellation Ursa Minor.

The Big Dipper in Ursa Major moves in the same way. When Cassiopeia is high, the Big Dipper is low, and when Cassiopeia is low, the Big Dipper is high.



**Cassiopeia and the Big Dipper appear to move around Polaris.**

## Cetus

Cetus (SEAT-us) has no particularly bright **stars**. In ancient Greek, its name means “whale” or “sea monster.” Cetus was the name of the sea monster that tried to eat the princess Andromeda in Greek mythology.



### What to look for in Cetus:

**The star Mira (MY-ra)**

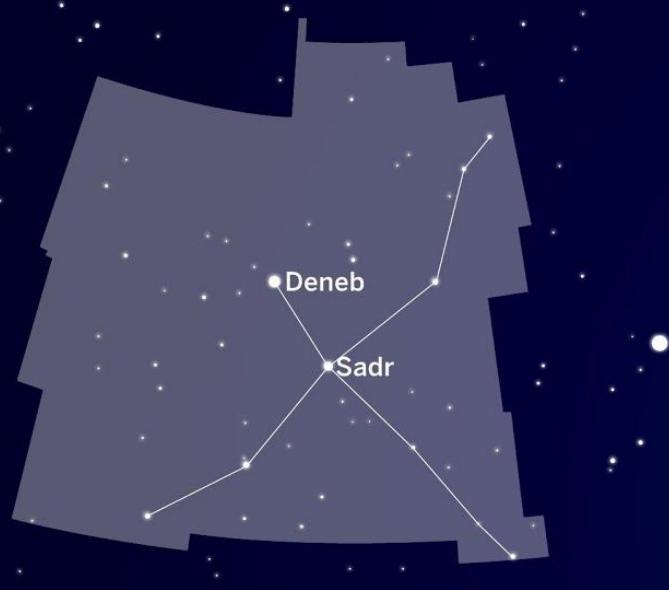
**Distance from the sun:** 300 light-years

**Diameter:** 500 million km (about 350 times the sun's diameter)

The brightness of Mira changes in a regular way over time. Sometimes it is medium-bright, but over several months it fades and becomes too dim to see. After a few more months it becomes bright again. It repeats this **pattern** every 332 **days**.

## Cygnus

Cygnus (SIG-nus) has **stars** that are known as the Northern Cross because of the shape they make. Cygnus means “swan” and in Greek mythology the name was used for several different magical swans.



**The Milky Way with the shape of the Northern Cross in Cygnus.**

### What to look for in Cygnus:

#### The star Deneb

**Distance from the sun:** 2,500 light-years

**Diameter:** about 300 million km

(about 200 times the sun's diameter)

Deneb is the 19th-brightest star in the night sky. It is very distant, but it is also very big, which is one reason it looks so bright. Deneb is at one of the corners of the shape called the Summer Triangle. The star Vega in the **constellation** Lyra and the star Altair in the constellation Aquila are at the other two corners.

#### The Milky Way

On a very dark night you might see a band of stars so faint and far away that they blend together to look like a splash of milk across the sky. This band of stars is called the Milky Way. (That is where the name of our **galaxy** comes from.) The Milky Way passes right through Cygnus.

## Gemini

Gemini (JEM-in-eye) is one of the 13 **constellations** that the **sun** appears in during the **year**. The sun is in Gemini from late June to late July. Gemini is Latin for “twins,” and in Greek mythology, the constellation is associated with twin brothers Castor and Pollux.



### What to look for in Gemini:

**The stars Castor (CAST-er) and Pollux (PA-lux)**

**Distance from the sun to Castor:** 52 light-years

**Distance from the sun to Pollux:** 34 light-years

Pollux is the 17th-brightest **star** in the night sky and Castor is the 23rd-brightest. Although they are known as the Twins, they are slightly different colors. Castor is a little more blue and Pollux is slightly orange.

## Hercules

Hercules (HER-cue-leez) has a shape like a box with arms and legs. It has no bright **stars**, so people often find it by finding the nearby bright star Vega in the **constellation** Lyra. Hercules is named after a hero from Roman mythology who was famous for his great strength and his ability to do things that no one else could do.



### What to look for in Hercules:

**The Great Globular (GLAH-bew-lar) Cluster**

**Distance from the sun:**

22,000 light-years

This cluster of stars is visible with the unaided eye on very dark nights and looks like a faint smudge. It contains about 300,000 stars and is shaped like a sphere.



**The Great Globular Cluster**

## Leo

Leo (LEE-oh) is one of the 13 **constellations** that the **sun** appears in during the **year**. The sun is in Leo from the middle of August to the middle of September. Many people find Leo by looking for a shape like a backward question mark. Leo is Latin for “lion,” and in Greek mythology it represents a dangerous magical lion that was killed by the hero Hercules.



### What to look for in Leo:

**The star Regulus (REG-you-lus)**

**Distance from the sun:** 79 light-years

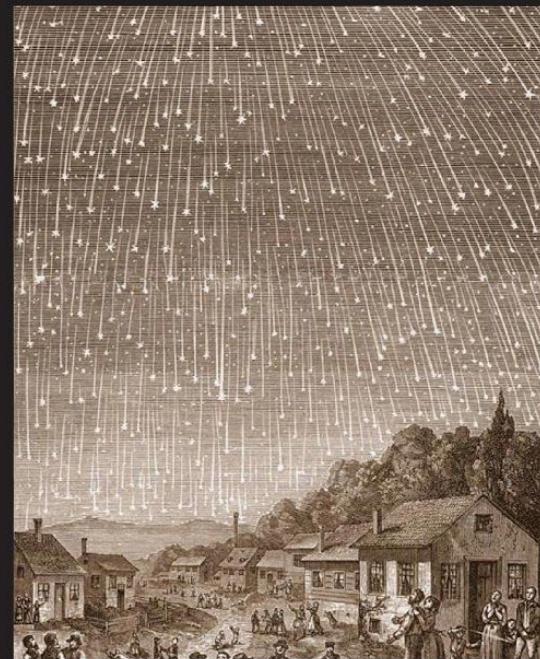
**Diameter:** about 4 million km

(about 3 times the sun's diameter)

Regulus is the 21st-brightest **star** in the night sky.

### Did you know that it can rain stars?

Of course it can't actually rain stars, but one night in 1833 it looked like the stars were falling. Streaks of light, called meteors, looked like they were coming out of the constellation Leo. Meteors are caused by small bits of rock speeding through the air around Earth. Meteors can come at any time, but sometimes Earth passes through a swarm of material, and there is a meteor shower. The shower of 1833 was an especially strong one.



## Libra

Libra (LEE-brah) is one of the 13 **constellations** that the **sun** appears in during the **year**. The sun is in Libra from late October to late November. There are no bright **stars** in Libra, which is in the space between Virgo and Scorpius. Its name is Latin for "scales" (the kind of scales that are used for weighing things).



### Did you know that other stars have planets?

We know the sun has planets—we live on one. Other stars are so far away that we can't easily tell if they have planets, but there are good clues. A small, faint star called Gliese 581, in the constellation Libra, seems to have three planets, maybe more. Most planets are either too hot or too cold for anything to live on, but there is a chance that one of the planets that **orbits** Gliese 581 is just right.



## Lyra

Lyra (LIE-rah) is a small **constellation** with one very bright **star**. Lyra is Latin for “lyre,” which is a type of musical instrument similar to a small harp that was played in ancient Greece.



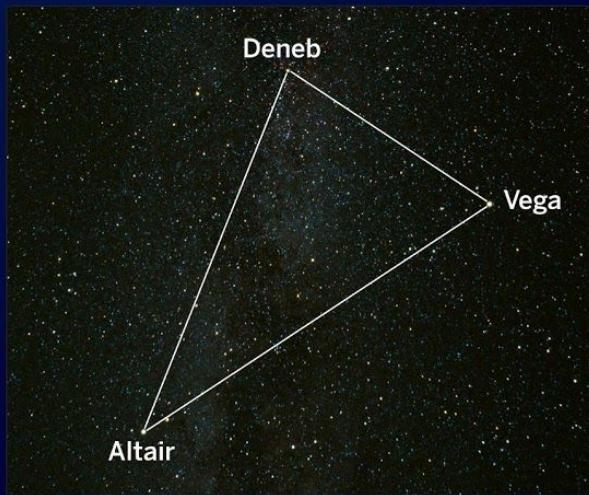
### What to look for in Lyra:

#### The star Vega (VAY-guh)

**Distance from the sun:** 25 light-years

Vega is the 5th-brightest star in the night sky. Vega is between two and three times as wide as the **sun**, but you cannot say exactly because Vega is not a **sphere**. It spins more quickly than most stars, so it bulges out in the middle.

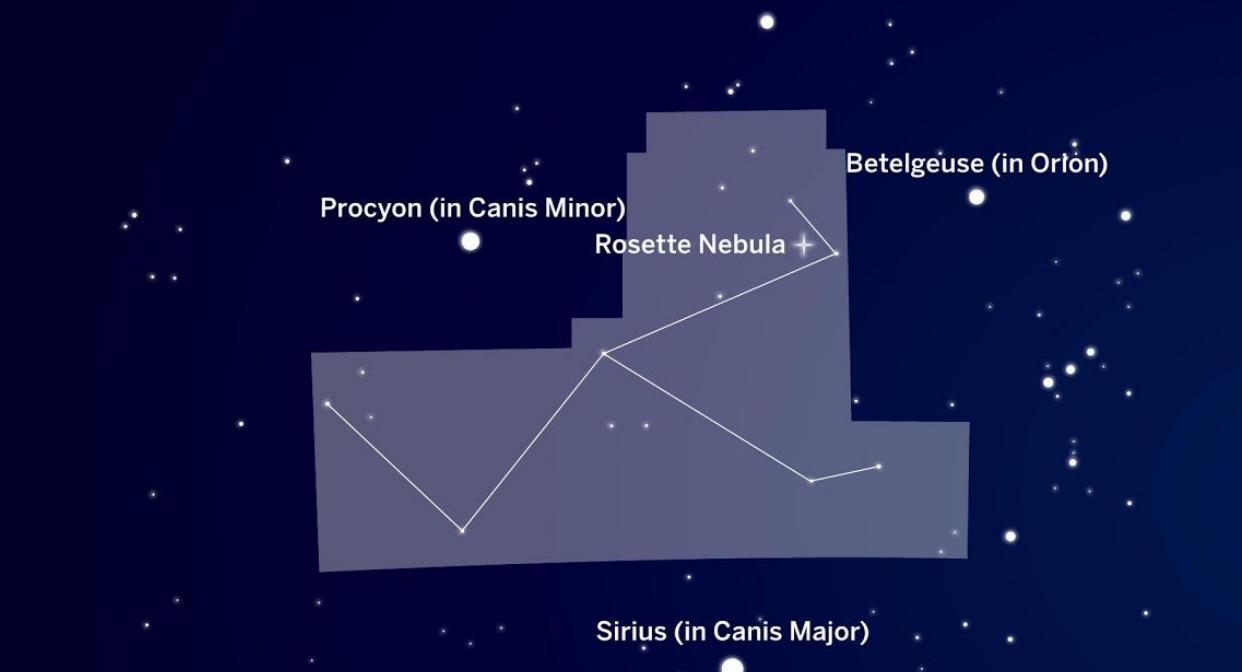
Vega is the brightest of the three stars that are at the corners of the shape called the Summer Triangle. The star Deneb in the constellation Cygnus and the star Altair in the constellation Aquila are at the other two corners.



The Summer Triangle

## Monoceros

Monoceros (muh-NAH-ser-us) has no bright **stars**, but it is surrounded by them. Sirius in the **constellation** Canis Major, Procyon in the constellation Canis Minor, and Betelgeuse in the constellation Orion form a triangle around Monoceros. Its name is Greek for “unicorn.”



### What to look for in Monoceros:

#### The Rosette (row-ZET) Nebula

This **nebula** surrounds a cluster of young stars. With binoculars or a small **telescope** you can see the star cluster, but it takes a bigger telescope to see the nebula around it.



**The Rosette Nebula**

# Ophiuchus

Ophiuchus (off-ee-YOU-kus) is one of the 13 **constellations** that the **sun** appears in during the **year**. The sun is in Ophiuchus from late November to late December. Ophiuchus means “serpent carrier” in Greek.



The Pipe Nebula

## What to look for in Ophiuchus:

### The Pipe Nebula

The Pipe **Nebula** is a dark nebula that you can see only because it blocks the light of the **stars** behind it. If the sky is dark enough that you can see the Milky Way, the Pipe Nebula shows up as a dark patch against the background of faraway stars.

# Orion

Orion (oh-RYE-on) is one of the most recognizable groups of **stars** in the sky. Some of the brightest stars in the night sky are part of Orion. Many people recognize Orion by the row of three stars known as Orion's Belt. Orion is named after a great hunter from Greek mythology. In North America, we see Orion in winter. At midnight in December, it is high in the sky.



The Orion Nebula

## What to look for in Orion:

### The star Betelgeuse (BEE-tul-joos)

**Distance from the sun:** 643 light-years

**Diameter:** about 1.4 billion km  
(about 1,000 times the sun's diameter)

Betelgeuse is the 9th-brightest star in the night sky. It is slightly more orange than most of the stars you can see. It is also one of the largest stars. Betelgeuse is so big that if it were in the center of our **solar system**, the **orbits** of Mercury, Venus, **Earth**, and Mars would be inside it.

### The star Rigel (RYE-jul)

**Distance from the sun:** 860 light-years

**Diameter:** about 100 million km  
(about 80 times the sun's diameter)

This star is the 7th-brightest star in the night sky. It is slightly blue.

### The Orion Nebula

This cloud of gas and dust is a place where new stars are forming. Without a **telescope** it looks like a faint star, but slightly fuzzier.

Orion's Belt can be used to help locate other stars in the sky. Follow the three stars to the left, and you come to the bright star Sirius in the **constellation** Canis Major. Follow them to the right, and you come to the star Aldebaran in the constellation Taurus. Keep going and you come to the star cluster called the Pleiades, also in Taurus.



## Pegasus

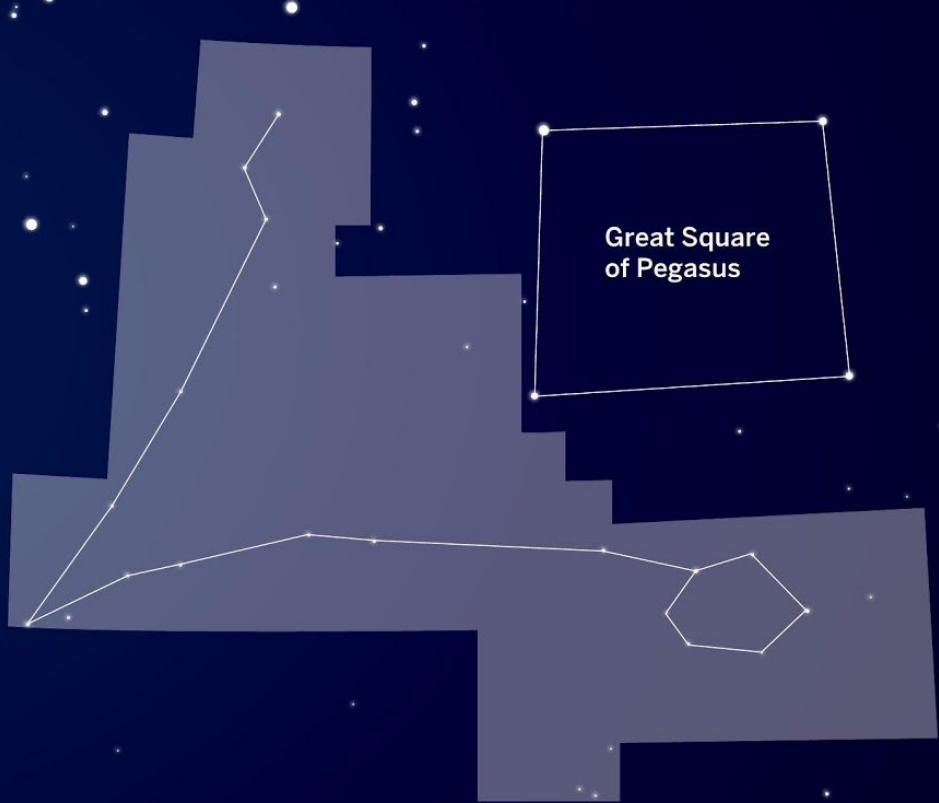
When people look at Pegasus (PEG-uh-sus), they usually notice four **stars** that make a large square shape. This is called the Great Square of Pegasus, even though one corner of the square is actually a star in the **constellation** Andromeda. Pegasus is named after a famous animal from Greek mythology, a magical flying horse. In North America, we see Pegasus in autumn. At midnight in September, it is high in the sky.



## Pisces

Pisces (PIE-seez) is one of the 13 **constellations** that the **sun** appears in during the **year**. The sun is in Pisces from the middle of March to the middle of April. Pisces is Latin for “fish.”

There are no bright **stars** in Pisces, so people often find it because it wraps around two sides of the Great Square of Pegasus.



## Sagittarius

Sagittarius (saj-i-TAIR-ee-us) is one of the 13 **constellations** that the **sun** appears in during the **year**. The sun is in Sagittarius from the middle of December to the middle of January. Some people recognize Sagittarius because the bright **stars** look like a teapot. Its name is Latin for “archer,” and it is named for a mythical creature that is half man and half horse and carries a bow and arrow.



### What to look for in Sagittarius:

#### The Lagoon Nebula

**Distance from the sun:** 643 light-years

This **nebula** is one of the brightest and is visible with the unaided eye if the sky is very dark. If you can see the shape of a teapot in Sagittarius, then the Lagoon Nebula is like a puff of steam from the spout.

#### The center of the Milky Way Galaxy

The Milky Way **Galaxy** surrounds us, and just about every star we see is part of it. Like many galaxies, the Milky Way Galaxy is flat like a pancake, with a large clump of stars in the middle. We are about halfway between the middle and the edge of the Milky Way Galaxy.

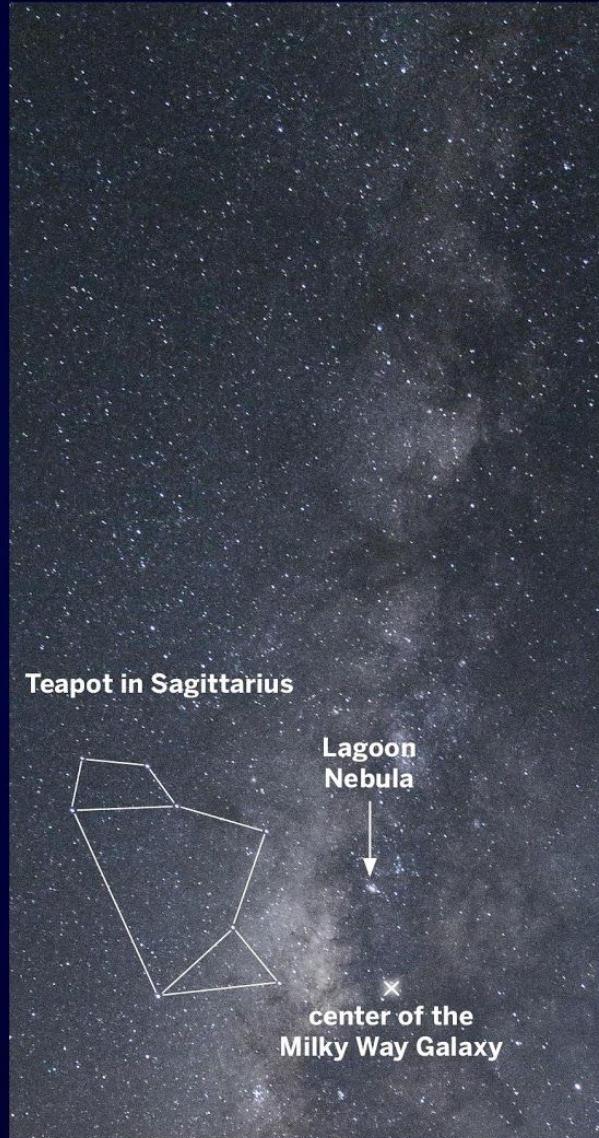
From our position we see many of the stars in the Milky Way Galaxy in a band across the sky. Most of the stars are so faint and far away that they blend together to look like milk splashed across the sky. This band of stars is called the Milky Way, and it is where our galaxy gets its name.



The Lagoon Nebula



**The Milky Way Galaxy is shaped something like this galaxy. We can't see the Milky Way Galaxy like this because we are inside it.**



## Scorpius

Scorpius (SCORE-pee-us) is one of the 13 **constellations** that the **sun** appears in during the **year**. The sun is in Scorpius for about a week in late November. You can recognize Scorpius by the hook shape made by several of its **stars**. Its name means "scorpion" and the hook shape is thought to look like the tail of a scorpion. In North America, we see Scorpius in summer. At midnight in June, it is visible above the southern horizon.



### What to look for in Scorpius:

#### The star Antares (an-TARE-eez)

**Distance from the sun:** 550 light-years  
**Diameter:** about 1.23 billion km  
(about 883 times the sun's diameter)

Antares is the 15th-brightest star in the night sky. It is one of the reddest stars. Its name means "the rival of Mars." Mars looks like a red star, but Antares really is one.

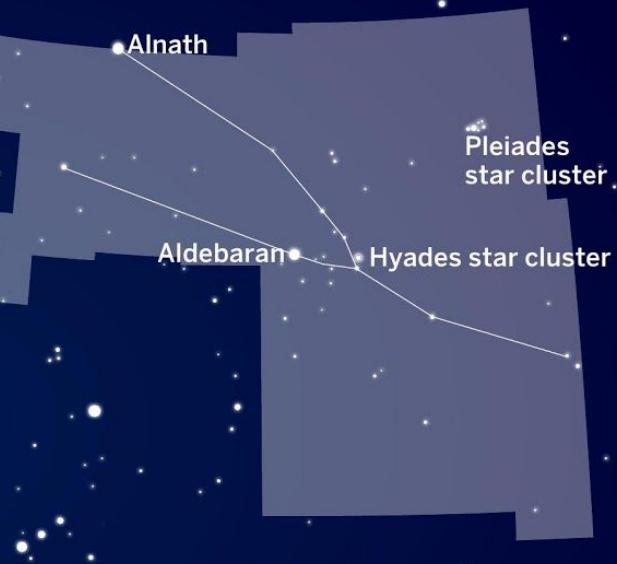
### Did you know that the largest and smallest stars are the same color?

Stars like Antares are called red supergiants. Red supergiants are the biggest kind of star ever observed. From Earth they look like tiny dots because they are so far away, but each one is hundreds of times larger than the sun. Supergiants are not the only kind of red star. Most red stars are much smaller, about one-tenth the diameter of the sun. We cannot see these stars without a telescope because they are so dim.



# Taurus

Taurus (TOR-us) is one of the 13 **constellations** that the **sun** appears in during the **year**. The sun is in Taurus from the middle of May to late June. Taurus is Latin for “the bull.” It was one of the most important constellations for ancient farmers.



## What to look for in Taurus:

### The Pleiades (PLEE-uh-deez) star cluster

**Distance from the sun:** 444 light-years

The Pleiades is the most famous and easy-to-see **star** cluster. It is sometimes called the Seven Sisters, although only six stars stand out. If you can see more than six, you can probably see nine or more. With a **telescope**, hundreds of stars are visible.

### The Hyades (HI-uh-deez) star cluster

**Distance from the sun:** 153 light-years

This cluster appears more spread out than the Pleiades. It also has hundreds of stars, although only ten or so are visible without a telescope.

### The star Aldebaran (al-DEB-er-an)

**Distance from the sun:** 444 light-years

**Diameter:** about 60 million km  
(about 44 times the sun's diameter)

Aldebaran is the 14th-brightest star in the night sky. It is an orange star. From **Earth** it looks like it is part of the Hyades, but it is actually much closer than the stars in that cluster.

## Ursa Major

Ursa Major (UR-suh MAY-jur) contains the seven bright **stars** that make the shape known as the Big Dipper, which looks like a cup with a long handle. In much of the Northern Hemisphere the Big Dipper is in the sky all night almost all **year** long. Ursa Major means “big bear” in Latin. Many ancient people thought the **constellation** looked like a bear.



### What to look for in Ursa Major:

**The stars Mizar (MEE-zar) and Alcor (AL-core)**

**Distance of Mizar from the sun:** 86 light-years

**Distance of Alcor from the sun:** 82 light-years

Mizar is the 69th-brightest star in the night sky. Alcor is much dimmer. What makes these stars special is that they appear so close together. A pair like this is called a double star. If the night is dark and clear you may be able to see both stars, but to some people they look like just one star. People use these stars to test how sharp their vision is.

The seven stars in Ursa Major that form the Big Dipper can be used to find other stars. At the end of the “cup” are two stars that point to Polaris in the constellation Ursa Minor, which contains the stars that form the Little Dipper. The rest of the stars in Ursa Minor are dim and hard to see, but you may find them if you remember that the Big Dipper pours into the Little Dipper.



The stars at the other end of the Big Dipper can help you find two other bright stars. If you follow the curve of the “handle” and keep going, you will come to the star Arcturus in the constellation Boötes. Keep going and you will come to the star Spica in the constellation Virgo.

## Ursa Minor

Ursa Minor (UR-suh MY-nur) contains the seven **stars** known as the Little Dipper. Unlike the nearby Big Dipper, the stars of the Little Dipper are not very bright. In fact, you might see only two stars unless it is very dark and clear. Ursa Minor means "small bear" and in Roman mythology it is the offspring of Ursa Major.



### What to look for in Ursa Minor:

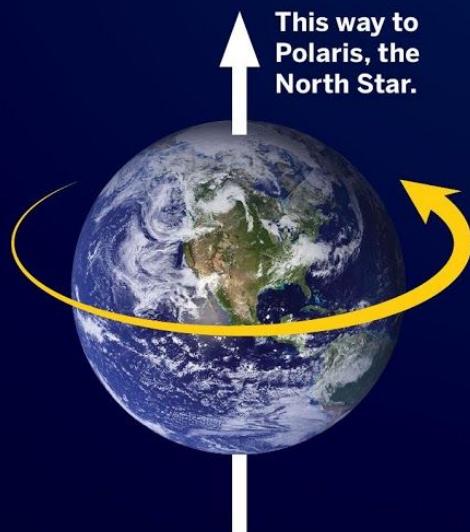
#### The star Polaris (po-LAH-ris)

**Distance from the sun:** 375 light-years

**Diameter:** about 60 million km (about 44 times the sun's diameter)

Polaris is the 48th-brightest star in the night sky. It is important because it is almost directly lined up with **Earth's axis**, which means that as Earth spins, Polaris seems to stay in one place while all the other stars seem to circle around it.

The direction you look to see Polaris is always north. For this reason Polaris is also called the North Star.



## Virgo

Virgo (VER-go) is one of the 13 **constellations** that the **sun** appears in during the **year**. The sun is in Virgo from the middle of September to late October. Virgo takes up a lot of space in the sky, but it has only one bright **star**. In Greek mythology, Virgo is associated with the goddess of farming.



### What to look for in Virgo:

#### The star Spica (SPY-ka)

**Distance from the sun:** 250 light-years

**Diameter:** about 10 million km (about 7 times the sun's diameter)

Spica is the 15th-brightest star in the night sky. Scientists looking at the light from Spica have discovered that it is really two stars, although they are so close together that they look like just one star, even with the largest **telescopes**.

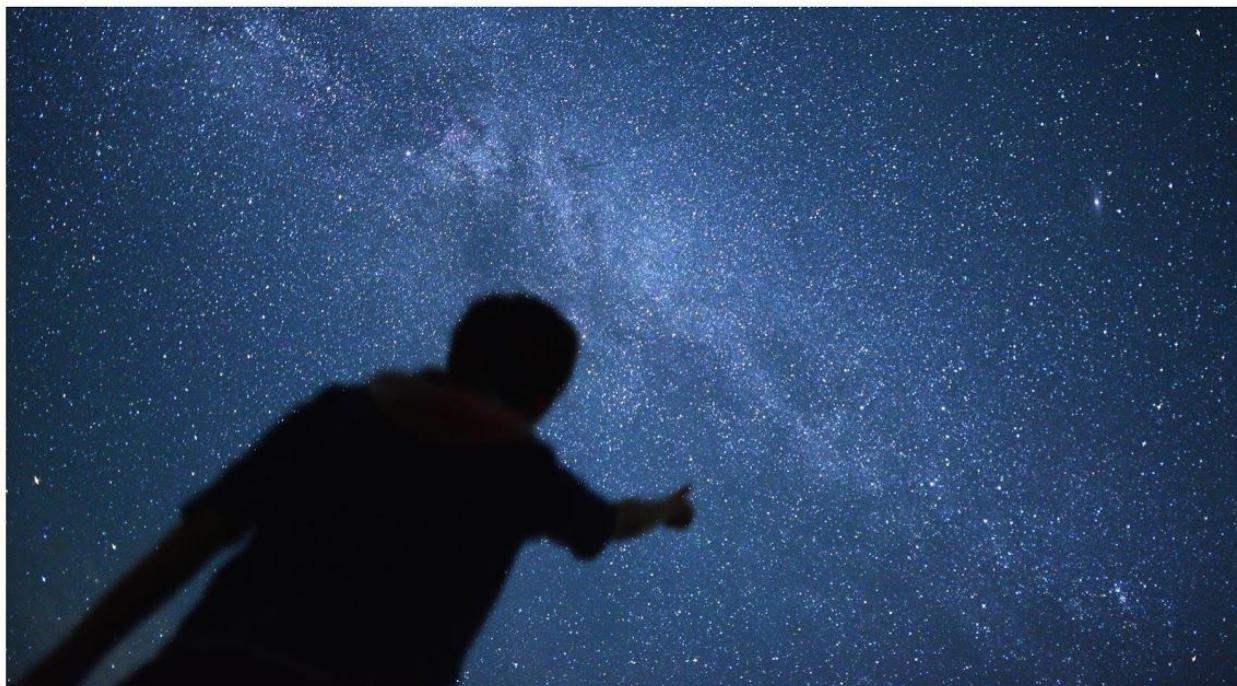
# Star Maps

A **star** map shows the portion of the sky that you can see from a certain place at a certain time. In real life, the sky is three-dimensional, surrounding you on all sides and above. On a star map, however, the sky is squeezed into a circle on a flat piece of paper.

## Which Star Map Should I Use?

One star map can't show how the sky looks all night long or all **year** long. As **Earth** spins, the stars and **constellations** that you can see appear to change positions. Over time, some stars rise into view, and some set. These **patterns** shift as Earth **orbits** the **sun** during the year. That is why this book has six different maps.

Each map is labeled for a range of three months, but on each map the time of night for each month is different. For instance, a map that shows the sky in the early evening in March is the same map that shows the sky in the middle of the night in January. Choose the map that is right for the time of night and the month of the year when you are stargazing.



# How to Use a Star Map

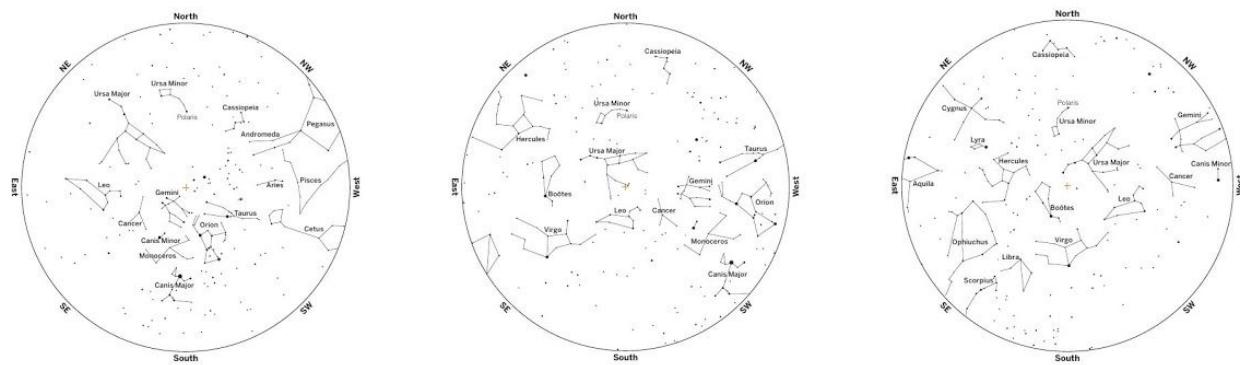
The center of the circle represents the **zenith**, the spot in the sky that is straight up, directly above you. It is marked on the **star** map with a “+.”

The edge of the circle represents the **horizon**, the place where the sky and **Earth** seem to come together. The horizon on the map is marked with the four directions: north, south, east, and west. They are arranged differently from the directions on ordinary maps of places on Earth because Earth is below you and the sky is above you.

You will need to find out which direction is which at the place where you are stargazing. You may use a compass or landmarks around you to help. If you can find the star Polaris, then you know which way is north.

There are four steps to finding a **constellation** in the sky that you see on the map.

1. Hold the map straight out in front of you. Turn the map so the constellation you are looking for is at the bottom, pointing toward the ground.
2. Identify which direction the constellation is in. The direction that is labeled at the bottom of the circle is the direction of the constellation.
3. Identify how high up the constellation is. If it is near the edge of the circle, it is low in the sky. If it is near the “+,” it is high in the sky.
4. Face the correct direction (for example, if the constellation is to the south, face south). Look up at the correct height (for example, if the constellation is near the edge of the circle on the map, look low in the sky). See if there are stars in the sky that match the stars on the map.

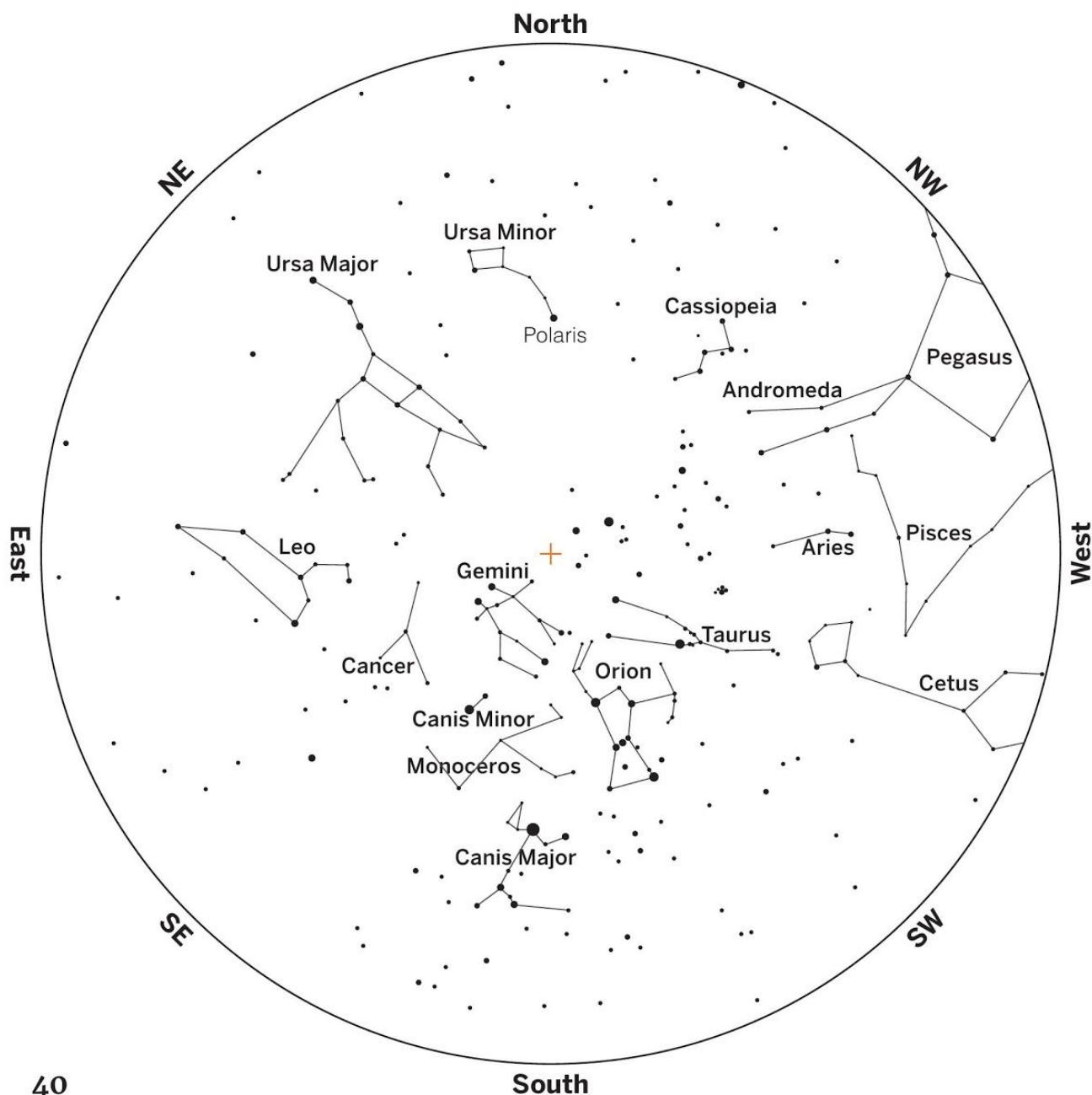


# Star Map for January, February, and March

Use in March at about 8:00 p.m.

Use in February at about 10:00 p.m.

Use in January at about 12:00 midnight.

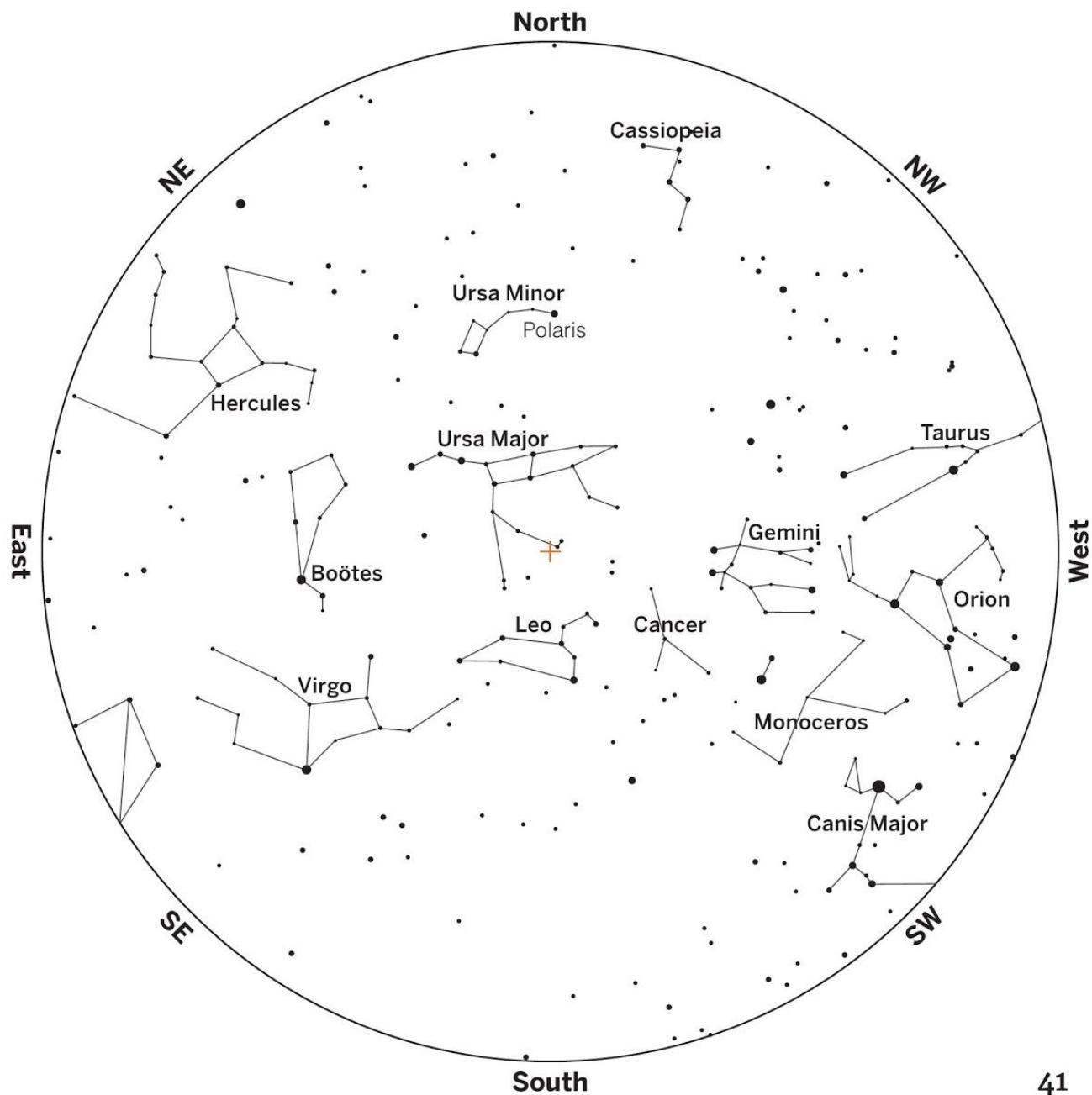


## Star Map for March, April, and May

Use in May at about 8:00 p.m. (9:00 p.m. daylight saving time).

Use in April at about 10:00 p.m. (11:00 p.m. daylight saving time).

Use in March at about 12:00 midnight (1:00 a.m. daylight saving time).

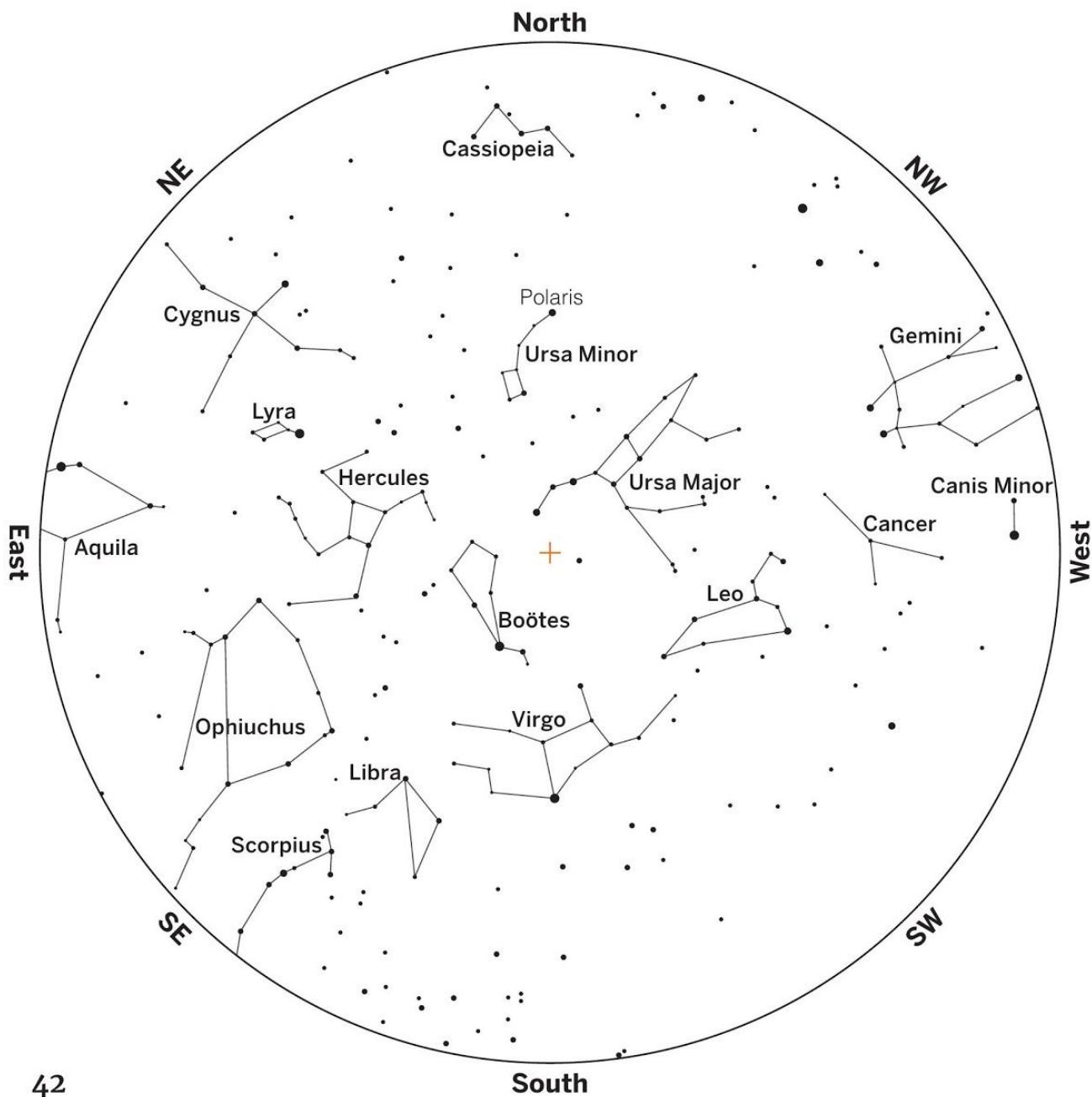


# Star Map for May, June, and July

Use in July at about 8:00 p.m. (9:00 p.m. daylight saving time).

Use in June at about 10:00 p.m. (11:00 p.m. daylight saving time).

Use in May at about 12:00 midnight (1:00 a.m. daylight saving time).

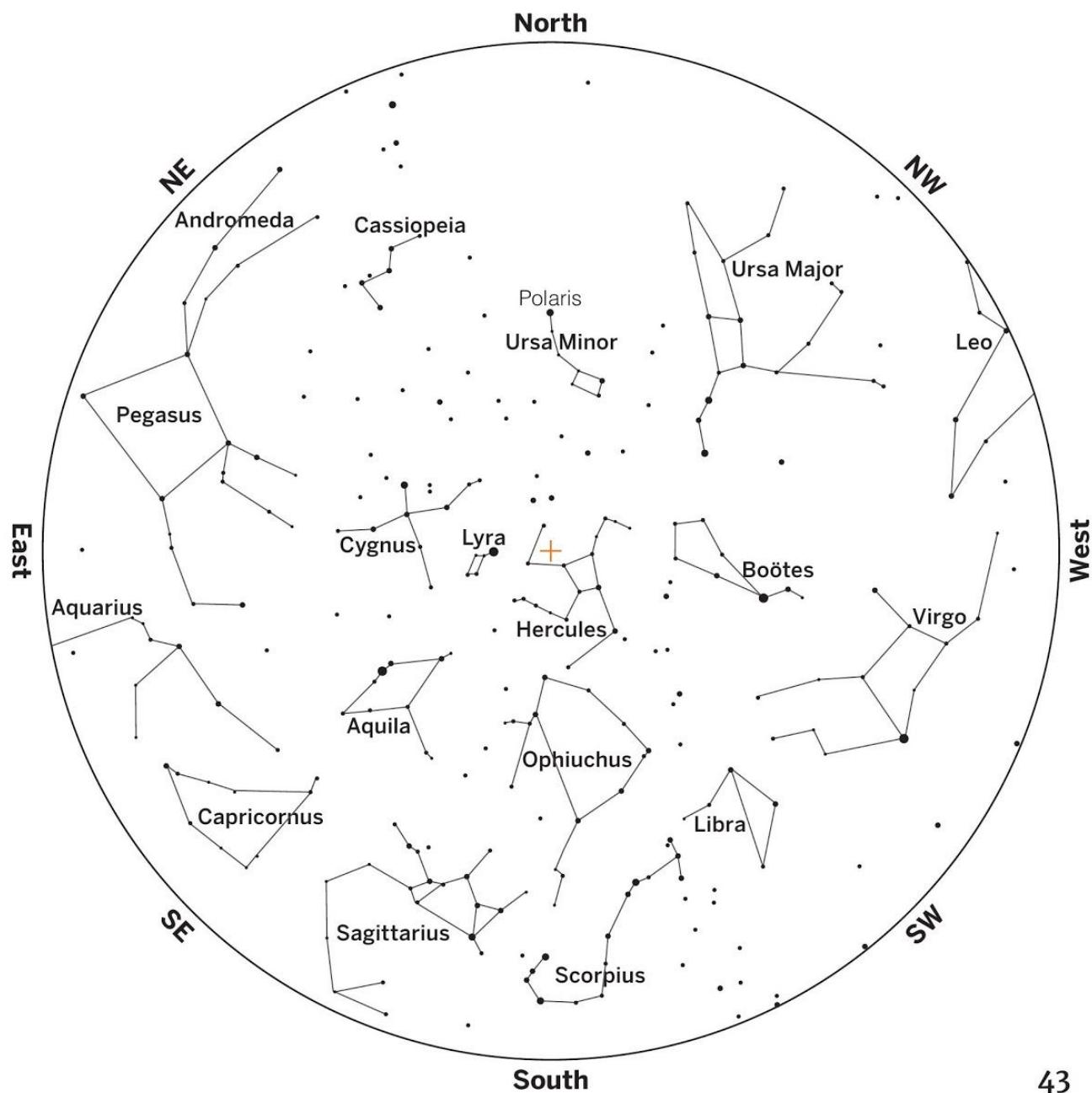


# Star Map for July, August, and September

Use in September at about 8:00 p.m. (9:00 p.m. daylight saving time).

Use in August at about 10:00 p.m. (11:00 p.m. daylight saving time).

Use in July at about 12:00 midnight (1:00 a.m. daylight saving time).

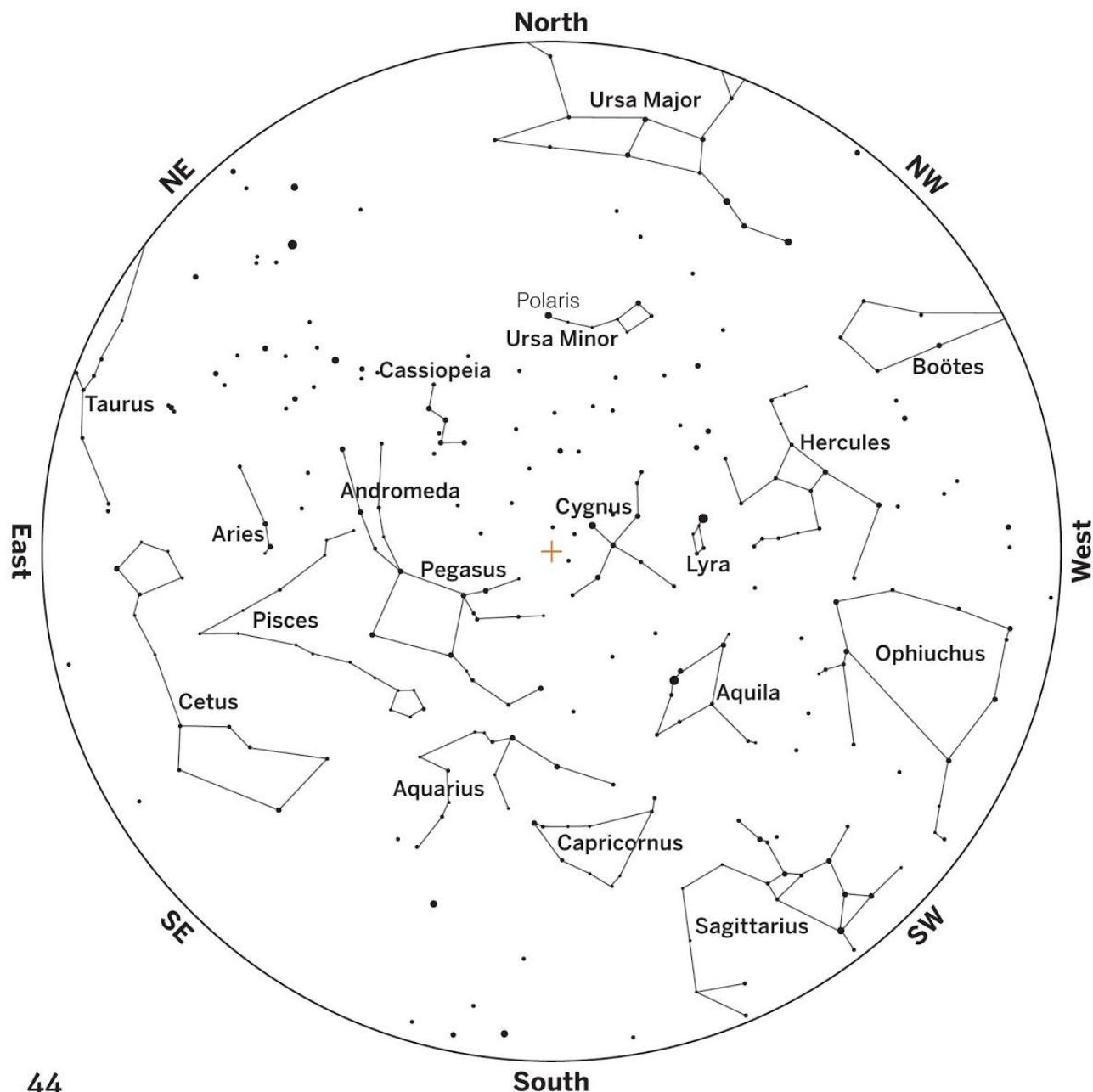


# Star Map for September, October, and November

Use in November at about 8:00 p.m.

Use in October at about 10:00 p.m. (9:00 p.m. daylight saving time).

Use in September at about 12:00 midnight (11:00 p.m. daylight saving time).

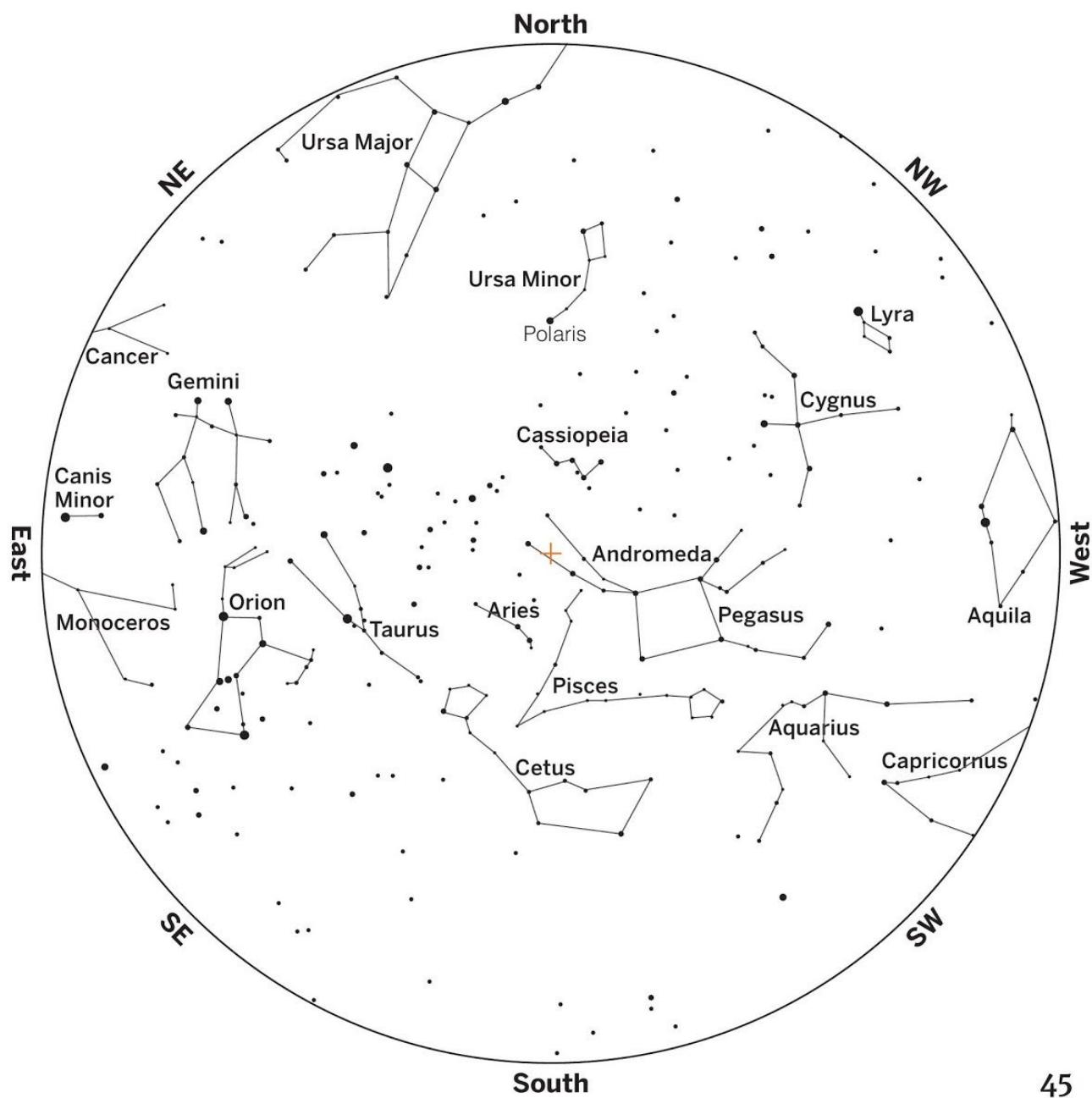


# Star Map for November, December, and January

Use in January at about 8:00 p.m.

Use in December at about 10:00 p.m.

Use in November at about 12:00 midnight.



# Glossary

**astronomer:** a scientist who studies stars, planets, and other objects in the universe

**axis:** the imaginary line that an object, such as Earth, spins around

**constellation:** an arrangement of stars as seen from Earth

**day:** a period of time that is 24 hours long and includes daytime and nighttime

**Earth:** the planet we live on

**galaxy:** a group of billions of stars

**horizon:** the line where Earth and the sky look like they come together

**light-year:** a unit of measurement that is equal to the distance light travels in a year

**nebula:** a cloud of gas and dust in space

**orbit:** to move in a regular path around something

**pattern:** something we observe to be similar over and over again

**planet:** a large ball-shaped object that orbits a star

**solar system:** the sun, the planets that orbit the sun, and other objects that orbit the sun

**sphere:** a ball-shaped object

**star:** a huge object in space that gives off heat and light

**sun:** the only star in our solar system

**telescope:** a tool for observing objects that are very far away

**year:** the length of time it takes for Earth to orbit the sun once

**zenith:** the spot in the sky that is directly above your head

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