

10:00 pm on December 1  
 9:00 pm on December 15  
 8:00 pm on January 1

**To use this chart:** hold the chart in front of you and turn it so the direction you are facing is at the bottom of the chart.

- **Bright Stars**
- **Medium Bright Stars**
- **Faint Stars**

**Scan dark skies with binoculars:**

- M-31: The Andromeda Galaxy
- M-42: The Orion Nebula
- M-45: Pleiades open star cluster

As winter approaches, sunrises occur later and sunsets occur earlier. The days are getting shorter! The longest night of the year is on the first day of winter, December 21. After that, the days will start to lengthen again.

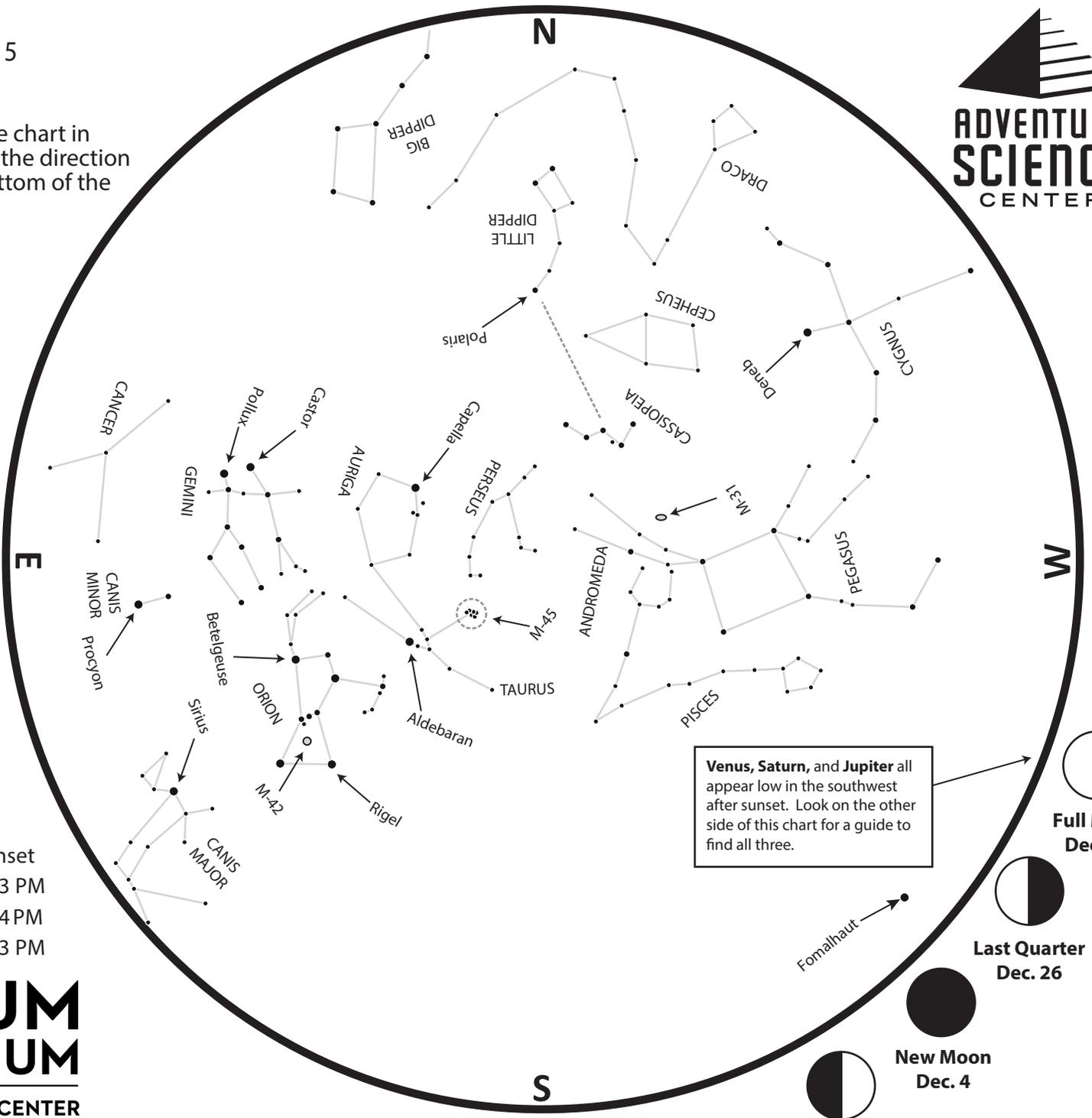
From Nashville:

	Sunrise	Sunset
Dec 1	6:39 AM	4:33 PM
Dec 15	6:51 AM	4:34 PM
Jan 1	6:58 AM	4:43 PM

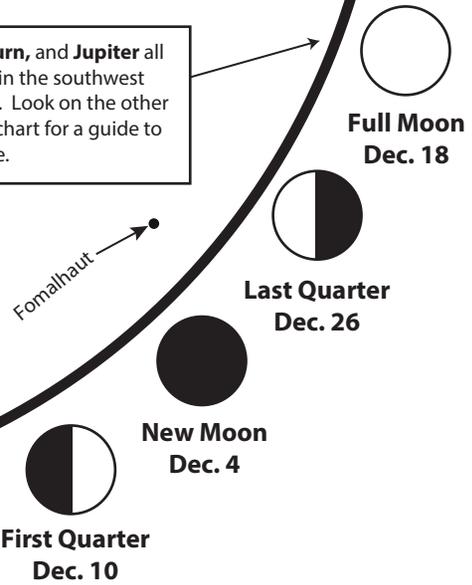
## SUDEKUM PLANETARIUM

AT ADVENTURE SCIENCE CENTER

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Venus, Saturn, and Jupiter all appear low in the southwest after sunset. Look on the other side of this chart for a guide to find all three.



# DECEMBER 2021

## After Sunset

As skies begin to darken after sunset, look to the southwest for a trio of planets stretching up from the horizon. Lowest to the horizon and brightest of the three is **Venus**. Above it is **Saturn**, the faintest of the three. **Jupiter** is highest up. Watch for a thin crescent Moon near Venus on the evening of December 6th, near Saturn on the 7th, and Jupiter on the 8th. As the month progresses, all of these planets will appear lower in the sky, setting earlier and earlier. Keep a close eye on Venus - if you can still see it low to the horizon by the last few days of the year, look just to its left for the dim, elusive planet **Mercury**. It may take a pair of binoculars to spot it. Always wait until the Sun has completely set before looking in that direction with binoculars or a telescope! Mercury will approach Saturn during the first couple weeks of the new year before disappearing back into the glow of sunset.

For much of the year, we use the stars of the **Big Dipper** to help us find **Polaris**, the **North Star**. However, the Big Dipper is harder to find in the autumn. It appears very low to the northern horizon after sunset. Some of its stars even set below the horizon from our latitude.

Another group of stars can help us find our way. Look for a group of five stars known as **Cassiopeia the Queen**. When the Big Dipper is low to the horizon, Cassiopeia is high in the north. The central peak of this constellation's W-shape also points you in the direction of Polaris.

Polaris is not a particularly bright star, but it does remain fixed in the sky throughout the night and throughout the year. When you face the North Star, you're facing due north. Polaris is at the end of the handle of the **Little Dipper**. This group of stars is officially known as **Ursa Minor the Little Bear**.

High in the west is the asterism called the Great Square of Pegasus. Three of these four stars are part of autumn constellation Pegasus the Flying Horse. The remaining star marks the head of Andromeda the Princess.

Later in the evening, you can find the bright stars of the winter evening sky beginning to rise. The most famous and easily found winter constellation is Orion the Hunter. Look for the three stars in a straight line that mark his belt, the two stars that mark his shoulders, and the two stars of his feet. Betelgeuse, one of this shoulder stars, is distinctly red in color. Learn to find Orion, and he can direct you to many

other sights of the winter sky. This part of the sky contains some of the brightest stars throughout the year.

Follow the belt down and to the left for the brightest star in the night sky, **Sirius**, in **Canis Major the Big Dog**. Follow the belt stars up and to the right to find orange star **Aldebaran**, the eye of **Taurus the Bull**. Look just past Aldebaran for a grouping of stars called **M-45**, or the **Pleiades Star Cluster**.

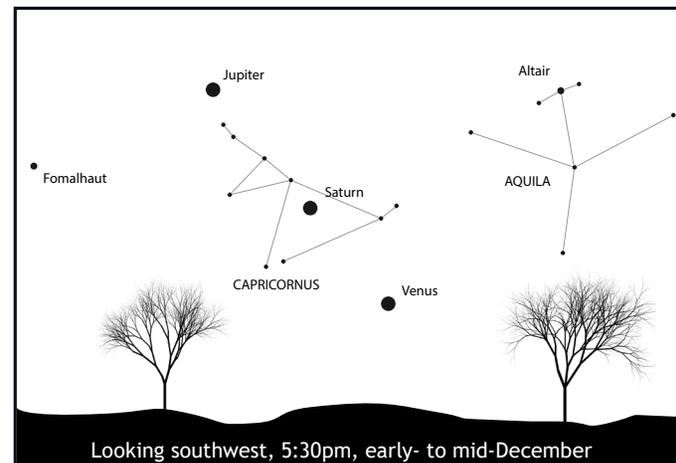
High above the head of Orion is the bright star **Capella**, part of **Auriga the Charioteer**. Capella represents a goat that Auriga is carrying. Look closely for three fainter stars in a small triangle shape: those are the 'kids'.

## From Dark Skies

Bright outdoor lighting can make it hard to see all but the brightest stars. On a clear night, find a dark spot far away from city lights, give your eyes time to adjust to the dark, and look for even more celestial sights. You can begin by looking for the fainter stars of this season's constellations. Pegasus, Andromeda, **Perseus the Hero** and many other fainter constellations all become easier to explore.

Late autumn evenings are great for spotting the **Milky Way** coursing from the eastern to western horizon, high overhead through Cassiopeia. This hazy band of light is the bulk of our disc-shaped galaxy, as we see it from within.

Near Andromeda, look for **M-31**, the **Andromeda Galaxy**. This massive spiral galaxy is the most distant object visible to the unaided eye, but to find it it requires crisp, dark skies and a little patience. Binoculars or a small telescope can improve the view, but don't expect to see more than a faint, fuzzy, oval blob. If you don't feel exactly awestruck at the sight, just remind yourself you're looking at the collected light of possibly one trillion stars, all at a distance of 2 million light years away. Now that's impressive!



## Early Morning

Throughout the year, the constellations rise and set just a little bit earlier every day. You won't see much difference from night to night, but you will over the course of weeks or months. What we see in today's pre-dawn sky is a preview of the early evening sky in later months. Go out before dawn this month for a look ahead at the autumn night sky.

In the hours before dawn, winter constellations Orion, Taurus, and Canis Major are setting in the west. The Big Dipper is now high in the northeast, easier to find than it was in the evening. Meanwhile, Cassiopeia is low in the northwest.

Desktop planetarium software like the free, open-source Stellarium (stellarium.org) can show you more precisely where night sky objects will be on any date and time, and help you plan your observing. Or, use it to recreate amazing planetary conjunctions from history or in the future!

## Geminid Meteor Shower

This year the **Geminid Meteor Shower** peaks on the morning of December 14th. Most meteor showers are best before dawn, but the Geminids are best a little earlier, peaking around 2:00 am. You might be able to see some late evening meteors too. No telescopes necessary! Bundle up warm, grab a lawn chair, a blanket, and a hot beverage - and bring a friend. Relax, gaze upwards, and most importantly, be patient.

The peak rate is about 120 meteors per hour, under skies far from city lights. That sounds like a lot, but it's only 2 per minute on average for the entire sky, under the darkest, clearest conditions, at the peak of the shower. This year, a bright Moon will make it hard to see all but the brightest meteors. If the weather looks bad for the morning of the 14th, try some mornings a few days before or after the peak.

The Geminids get their name from the constellation **Gemini the Twins**. Geminid meteors may appear anywhere in the sky, but they all will appear to be coming from the direction of Gemini.

## This Month in the Sudekum Planetarium

S P A C E  
E X P L O R E R S  
T H E I S S E X P E R I E N C E

**POLARIS**  
THE SPACE SUBMARINE  
AND THE MYSTERY OF  
THE POLAR NIGHT

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