

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 also the first day of winter, December 21. After that, the days will start to lengthen again.

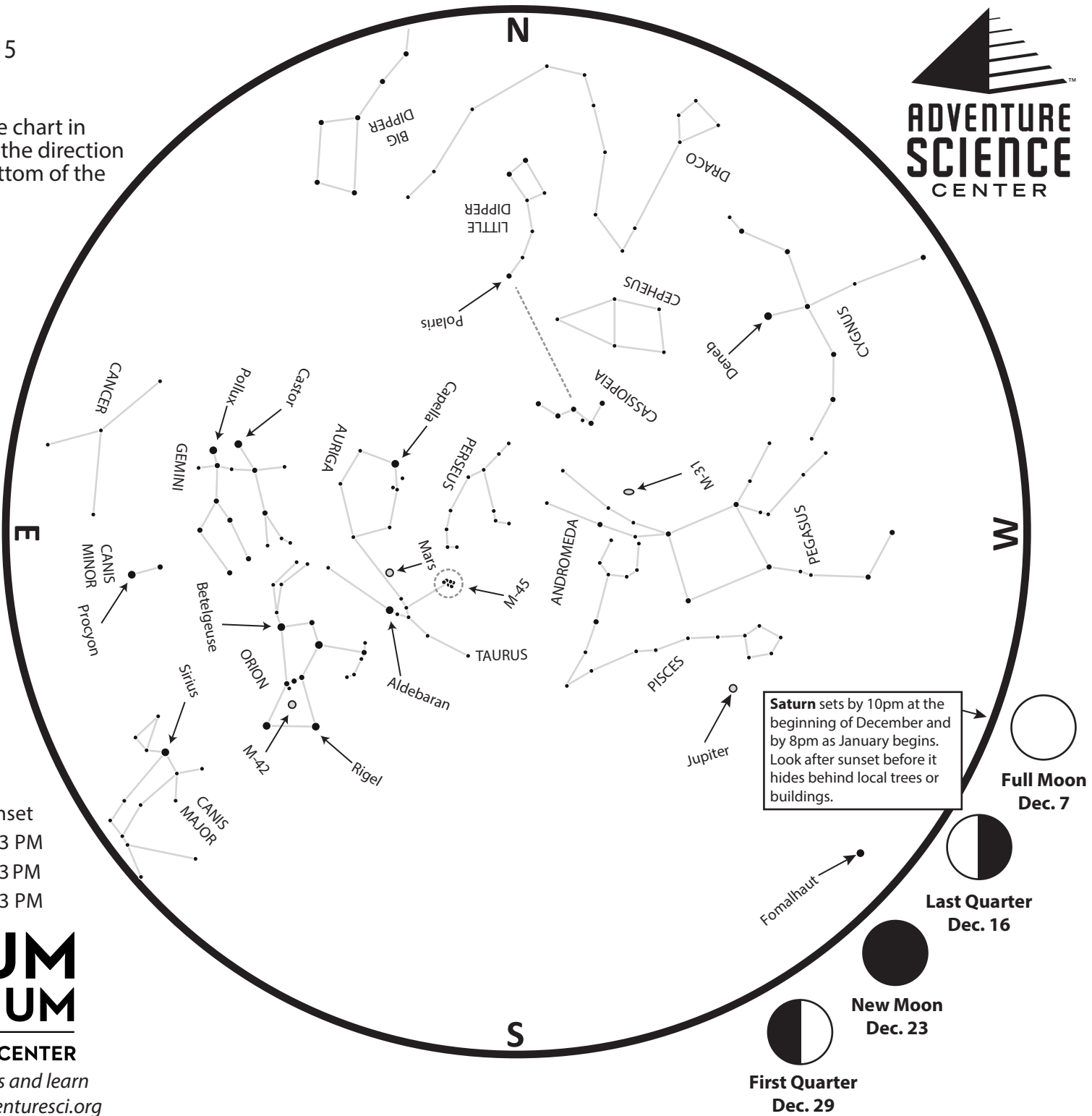
From Nashville:

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

SUDEKUM PLANETARIUM

AT ADVENTURE SCIENCE CENTER

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DECEMBER 2022

After 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**.

Nearly overhead 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**.

As the sky darkens, look high in the south for **Jupiter**, easily the single brightest point of light in the evening sky. Whenever Jupiter is visible it's always a great target for backyard telescopes. You'll not only see the four largest moons of Jupiter, but also the giant planet's cloud bands. Jupiter has stripes!

Low in the southwest is **Saturn**, which is currently far fainter than Jupiter. A small telescope will reveal its beautiful rings. Saturn will set early - by 10 pm early in the month and by 8 pm at the end of the month.

To the east is one more planet, **Mars**. Mars is currently at **opposition**. A planet is at opposition when its opposite the Sun in our sky. That also means that the planet is making its closest approach to Earth. Mars will look bright, and a little bigger and better than usual in telescopes. The exact date of this opposition of Mars is December 8, but any time this month is great for a good look at the Red Planet. Mars reaches opposition with Earth about every 26 months.

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'.

Don't mistake Aldebaran or Betelgeuse with Mars! Mars will be brighter than either of the red-orange stars, and won't be twinkling like stars do.

Look for the Moon near Jupiter on December 1st, 28th and 29th and very, very near Mars on December 7th. In fact, from many places in the US and beyond, the Moon will pass directly in front of Mars in a **lunar occultation**. Just like a solar eclipse, your exact location will determine what you see, and when you will see it. Locally, observers in most of Nashville will just see the limb of the Moon just graze past Mars around 9:30 in the evening. Northwest of downtown, the Moon will cover more of Mars. Visit Adventure Science Center's blog at adventuresci.org/blog for more details about this event.

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 preview the lunar occultation of Mars from your exact location!

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
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T H E F I S S I L E 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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