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## Start the New Year with a shower

In addition to large objects such as the planets and their moons, asteroids, and comets, our solar system contains countless bits of debris called meteoroids. Some of these bits have been around since the formation of our solar system. Over time, the bits of debris have been broken down into smaller bits, thanks to near-Sun encounters and collisions with other bits of debris. Currently, the majority of meteoroids orbiting the Sun are sand-size particles.

Throughout the year, as the Earth moves along its orbital path, streaks of light blaze across the sky whenever a meteoroid falls into the upper regions of the Earth's atmosphere (at which time they officially become meteors). Frictional forces heat the debris, causing them to glow or catch fire, and result in a shooting star. Many are bright enough to be seen with the naked eye. Others, known as fireballs or bolides, glow brightly and leave a trail that is visible to the naked eye for several seconds.

### Shower science

In addition to the random and sporadic blazes of light that brighten the sky, each month a more regular and

predictable event, known as a meteor shower, occurs. (Some of these are not visible without the aid of binoculars or a telescope.) A meteor shower results when the Earth passes through a region of space where a cloud of debris has been left behind by a comet orbiting the Sun. A meteor shower lasts several days as Earth passes through the debris field. A meteor shower is named for its radiant, or the constellation from which it appears to emanate. Some of the noteworthy meteor showers will include Quadrantids (January), Lyrids (April), Perseids (August), Leonids (November), and Geminids (December).

Two major factors affect the visibility of meteor showers: the phase of the Moon and the Zenith Hourly Rate (ZHR). The reflected light from a full moon can hinder your observations, so the best time to view meteors is during a new moon. The ZHR is the expected average number of meteors per hour, which increases up to the peak night of a shower, and then tapers off. The higher the ZHR, the better your chances of spotting a meteor. Astronomers estimate the date and time for a shower's peak by

studying its previous peaks. The best viewing time for most meteor showers occurs between midnight and sunrise. Why? Because during this time, the viewer is positioned on the face of the Earth that is heading into the meteor shower.

This year, the January Quadrantids will probably provide the best meteor shower because the Moon will be bright in the skies during the other showers' peak times. The Quadrantids radiate from an area north of the head of Bootes, the Herdsman. Bootes rises over the east-northeast horizon around midnight during the midwinter months in the Northern Hemisphere. The meteor shower lasts about five days, beginning on January 1, and peaks during the predawn hours of January 3. The exact source of this meteor shower is not certain, but under good viewing conditions, averages around 85 meteors per hour.

### Comet watch

During the middle of January, Comet Tempel-Tuttle passes closest to the Earth as it travels inbound toward its perihelion, or point of closest approach to the Sun. It will reach this point on February 28. At its brightest, the comet will only reach the ninth magnitude. Thus, the comet will not be bright enough to view without binoculars. However, with the help of a small telescope or strong binoculars, a viewer will be able to see a fuzzy smudge slightly elongated on the side of its farthest from the Sun.

While Tempel-Tuttle may not shatter any records for brightness, it does provide the source material for an annual meteor shower—the Leonid Meteor Storm, which results from the debris that the Earth passes through during November. In the year during or after the perihelion passage of Comet Tempel-Tuttle, the Leonid Meteor Shower becomes the Leonid Meteor Storm, a brief,

intense period of activity. During its most recent occurrence, in November of 1966, the western United States was treated to a predawn display of meteors with a ZHR numbering in the tens of thousands.

### Visible planets

**Venus:** Moves from the evening to morning skies.

**Mercury:** Rises about 30 minutes before the Sun.

**Mars:** Very low over western horizon, sets about 30 minutes after sunset.

**Jupiter:** Visible over southwestern horizon at sunset.

**Saturn:** Visible over southern horizon at sunset.

### Moon phases

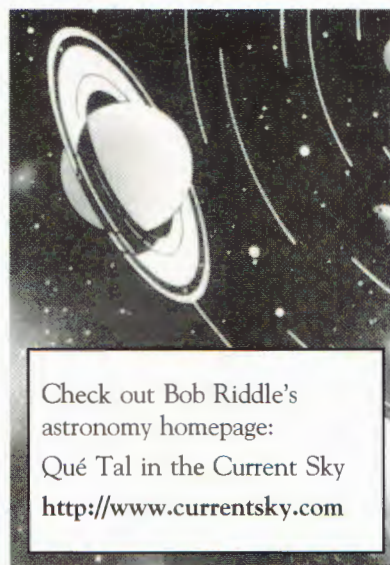
#### January

First Quarter - January 5  
Full Moon - January 12  
Last Quarter - January 20  
New Moon - January 28

#### February

First Quarter - February 5  
Full Moon - February 12  
Last Quarter - February 20  
New Moon - February 28

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