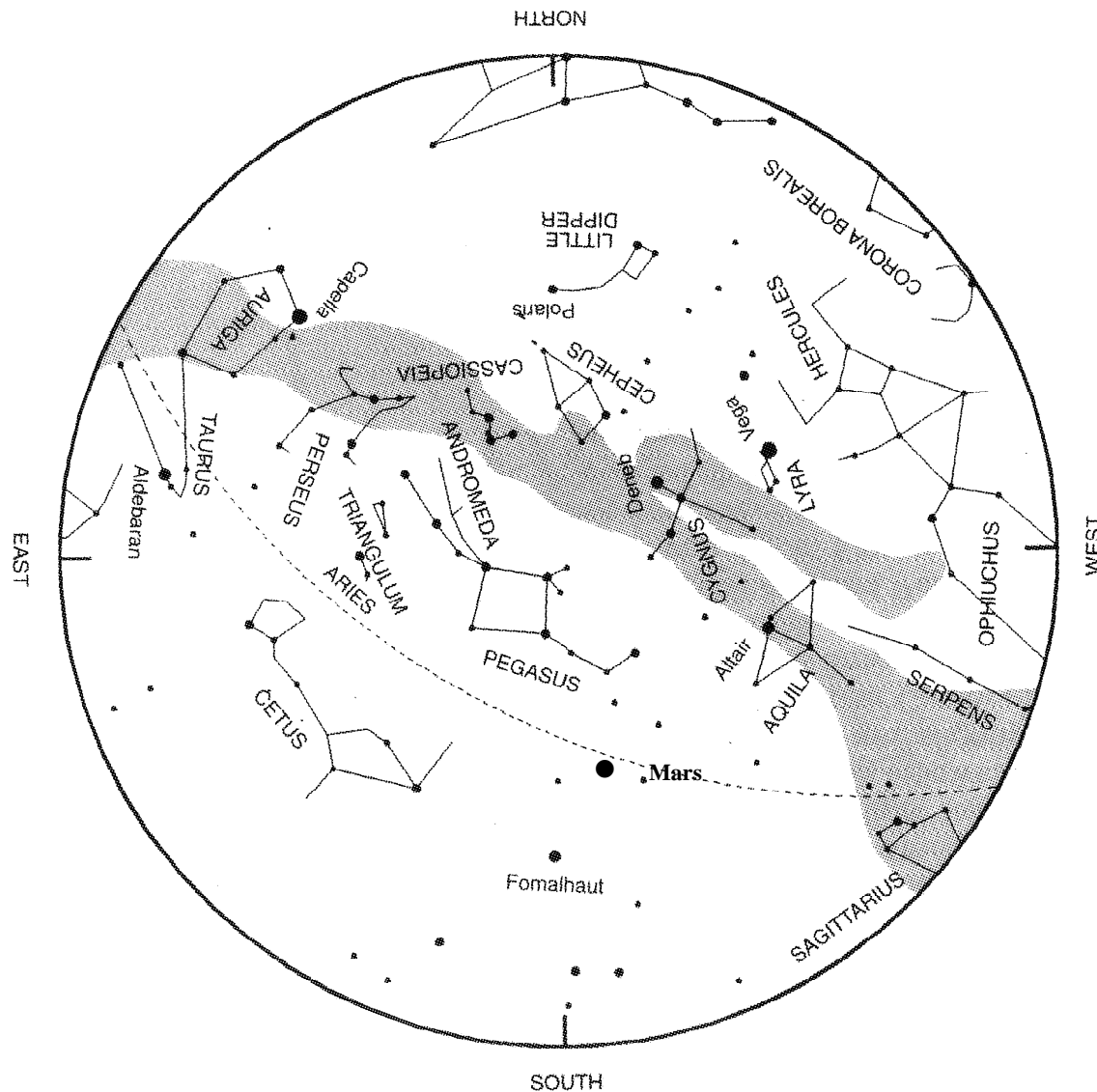


Autumn All Sky Star Map



Autumn Season Star Map—This star map is drawn for 35 degrees north latitude at 9:00 PM in the middle of the season. It can be useful at any mid-northern latitude in the evening hours throughout the season, if you realize that the overhead stars shift westward with time. This map is from the booklet *Exploring the Sky with Binoculars* by David Chandler and Don Davis, available from AstroMax.com. Rotate the map so that the direction around the circle is on the bottom in the direction you are looking.

The Autumn Sky

First find north, which is marked by **Polaris**, the star which lies at the end of the handle of the Little Dipper. Only three stars from the Little Dipper are bright enough to be seen from urban locations: Polaris and the two stars at the far end of the cup. The stars in between are very faint and cannot be seen unless the sky is quite dark. Once you locate Polaris you can always count on finding it in the same place. The rest of the stars circle around the sky, but being at the pole, Polaris stays fixed.

Face west and look high in the sky to find three very bright stars forming a large south-pointing triangle. This is the **Summer Triangle**, consisting of Vega, Altair, and Deneb.

Face south to find the first magnitude star **Fomalhaut**, the only bright star in the entire region. This year, **Mars** will be found to the north of Fomalhaut.

Look to the northeast where the stars **Capella** and **Aldebaran** are starting to rise. Slightly above Aldebaran is the conspicuous cluster of stars called the **Pleiades**. This cluster is frequently mistaken for the Little Dipper.

Face a little to the east of north and look fairly high in the sky along the Milky Way to find the "W" shaped constellation **Cassiopeia**. The top of the "W" faces down and to the left toward Polaris.

Follow the Milky Way toward the east from Cassiopeia to find **Perseus**, with its lower arm curved toward the Pleiades.

The **Great Square of Pegasus** is almost overhead. Its stars are only moderately bright, but the other stars in this part of the sky are even less so. Follow the double chain of Andromeda to the northwest from Pegasus. Don't neglect Andromeda's two small tagalong constellations, **Triangulum** and **Aries**.

Most of the constellations south of Pegasus are rather faint. To locate them, refer to a star map or a planisphere and use Fomalhaut as a reference point

- 3rd magnitude star
- 2nd magnitude star
- 1st magnitude star or brighter

Keep in mind that planets may be in the sky. The path of the planets across the sky, called the ecliptic, is indicated by a dashed line on the star map. Any really bright "stars" along the ecliptic not shown on the charts are probably planets.



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2003 Mars Opposition Timetable

In **July**, Mars burns at magnitude -2.3, the brightest object in the sky. Mars begins retrograde motion relative to the stars July 29-30. The relative size of the planet is now 16" to 22"—the biggest it has appeared since 1988. The southern half of Mars is becoming ever more tilted toward Earth and the rapidly melting polar ice-cap is a fascinating sight. On the morning of July 17, viewers in North America can see Mars perched on the upper edge of the Moon; there will be a spectacular occultation of Mars for viewers in the extreme south-eastern US.

In **August**, Mars, located in the constellation Aquarius, makes its closest approach to Earth on August 27, with an apparent diameter of 25.1" and a magnitude of -2.9. The planet reaches perihelion on August 30, only two days after opposition. Observers should see intricate details on the Martian surface, unless they are obscured by dust storms, but the southern polar ice-cap will now be a tiny speck as the Martian summer approaches. For observers in northern latitudes, Mars will be only 34 degrees above the southern horizon. If you have a fairly large telescope, try to catch a glimpse of the Martian moons, Phobos and Deimos.

In **September**, Mars still holds center stage at magnitude -2.9 and diameter 25". Earth now begins to pull rapidly away from the planet and Mars will begin to lose brightness. By month's end, magnitude will have decreased to -2.2 and diameter to 22". But Mars now reaches its highest point before midnight, making it convenient for observations, with a higher likelihood of steady skies.

In **October**, Mars is still a stunning sight, although it will fade from -2.2 to the brightness of Sirius by month's end. The diameter of the planet will also shrink from 22" to 15". Mars now does not set until well after midnight.

In **November**, Mars remains a bright object, but its diameter has dwindled from 15" to 11". It is still big enough to show some interesting surface markings on steady nights.

In **December**, Mars is still the most prominent object in the sky, shining at about 0 magnitude. Unfortunately, the planet is only 40% as wide as it was in August and shows few surface markings in medium-sized telescopes.

2003 - The Mars Year

During August 2003, Mars, the Red Planet, will be closer to Earth than it has ever been before in recorded history. On the date of closest approach, August 28, 2003, Mars will be only 55.8 million kilometers or 34,646,418 miles from Earth, little more than 1/3 of an Astronomical Unit (AU). An astronomical unit is the average distance from the Earth to the Sun, about 165 million kilometers. This will be the closest together Mars and Earth have been in the last 50,000 years!

The Features of Mars

Of all the worlds in the solar system, Mars is the most Earthlike. It has ever-changing weather, seasonal thawing of polar ice caps, clouds, vast dust storms, and four seasons. The changes are what you want to observe.

Polar Ice Caps: The Martian polar ice caps are bright, easy to see, and undergo fascinating seasonal changes. They thaw in the spring in each Martian hemisphere and re-form each autumn in an annual cycle of the seasons.

Martian Atmosphere: Mars has an amazingly dynamic atmosphere. White water clouds, bluish limb hazes, and bright surface ice-fogs and frosts are regularly seen and tracked by Mars observers.

Dust Storms: Observations of Mars indicate that yellow dust storms occur around the time of southern summer solstice, soon after Mars reaches perihelion. During the opposition in June 2001, dust storms spread to the whole surface of Mars. It is unlikely that two major dust storms will occur on successive apparitions.



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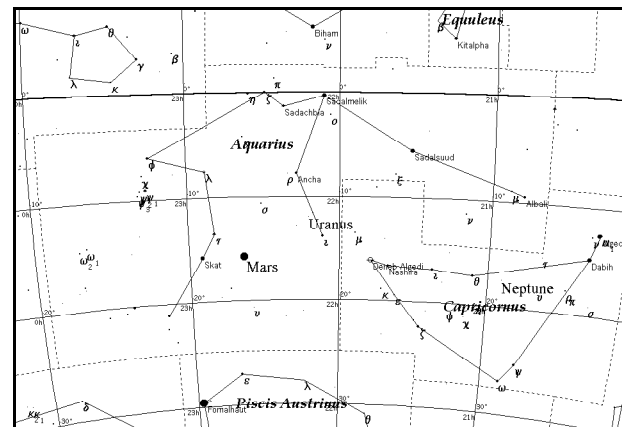
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In 2003 Mars will reach opposition in the constellation Aquarius near the celestial equator. The moment of closest approach occurs on August 27, 2003, at 09:52 UT. Note that Uranus is also in Aquarius, and that Neptune is just next door in Capricorn.

At opposition, Mars will shine as a brilliant yellow-orange beacon in the sky. Through a telescope, Mars will at first present only a shimmering yellow-orange disk. To the visual observer viewing it at 80x magnification, Mars will appear as large as the Full Moon viewed with the naked eye. Mars is then 25 arc-seconds in diameter. To place this in perspective, this is the angular diameter of a basketball one mile away.

Earth and Mars Compared

	Earth	Mars
Equatorial diameter (Km)	12756	6794
Density (kg/m ²)	5517	3933
Mass (Earth=1)	1	0.107
Surface gravity (Earth=1)	1	0.38
Escape velocity (km/s)	11.2	5.03
Mean distance from sun (AU)	1	1.5236915
Mean distance from sun (miles)	9.3x10 ⁽⁷⁾	1.413x10 ⁽⁸⁾
Mean distance from sun (10 ⁽⁶⁾ Km)	149.6	227.9
Orbital period (Earth years)	1	1.88
Orbital period (Earth days)	365.24	686.95
Orbital velocity (Km/sec)	29.79	24.13
Average Surface Temperature (K)	280	210